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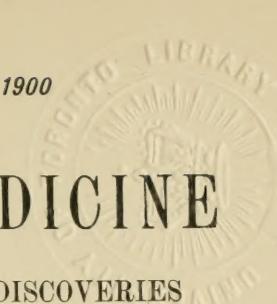
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PROGRESSIVE MEDICINE

A QUARTERLY DIGEST OF ADVANCES, DISCOVERIES
AND IMPROVEMENTS

IN THE

MEDICAL AND SURGICAL SCIENCES

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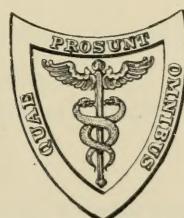
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VOLUME III. SEPTEMBER, 1918

DISEASES OF THE THORAX AND ITS VISCERA, INCLUDING THE HEART, LUNGS AND
BLOODVESSELS—DERMATOLOGY AND SYPHILIS—OBSTETRICS—
DISEASES OF THE NERVOUS SYSTEM



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PROGRESSIVE MEDICINE.

SEPTEMBER, 1918.

DISEASES OF THE THORAX AND ITS VISCERA, INCLUDING THE HEART, LUNGS AND BLOODVESSELS.

By WILLIAM EWART, M.D., F.R.C.P.

THE outstanding feature in the past medical year has been the organization in the United States, within an incredibly short time, of an expeditionary medical service of unparalleled completeness and efficiency in its scientific and material equipment. The experience accumulated at the front during the past three years has been turned to account for new departures in every practical direction. The vastness of that creative effort, as reflected in the medical literature of the last twelve months, is beyond the limited scope of this report, which can only admit these few words of recognition.

PULMONARY TUBERCULOSIS.

The Diagnostic Value of the X-rays in Phthisis is, according to G. W. Holmes's¹ statement, about equal to that of the physical signs when either of them are taken separately apart from any other evidence. Both fluoroscopy and radiography have their uses and their limitations. The former is cheaper, easier and quicker, and the image is that of the living, moving organs not obtainable from the photographic plate. Its disadvantages are the inability to study the detailed structure of the lungs, and that it does not give a permanent record. We have to trust our own sight or that of the radiologist, whereas with the plate a joint study is possible. The radiographic record is accurate and permanent and shows any variation from the normal density. The ideal method seems to be a fluoroscopic examination, when definite records are made of the excursion of the diaphragm, of changes in the shape of abnormal shadows, and of the illumination of the lung fields during respiration and coughing. Then, if the diagnosis is in doubt or negative, stereoscopic plates can be taken, or one may suffice if the fluoroscopic findings be fairly definite.

¹ Boston Medical and Surgical Journal, January 17, 1918.

George E. Pfahler's² instructive paper deals with the technical and the differential details. Tuberculosis can be recognized as early as the tissue changes produce an increased density of the lung. The plates should be made stereoscopically, preferably a pair of stereoscopic plates anteriorly, and a pair posteriorly. A special plate should be made of the apices, eight by ten inches in size, the rays being sent obliquely downward in line with the chin, so as to project the clavicles downward and clear the apices, while the patient is instructed to exhale forcibly against resistance, an ordinary deep breath being forced against the lips and palate without allowing any air to escape. In a healthy individual this can be seen fluoroscopically to distend the apices. During held inspiration the bases become greatly distended but the apices are less distended. During exhalation they become distended with air and beautifully illuminated. The evidence of early tuberculosis consists in the minute deposits of tubercle at the points which pathologists have long determined to be the most vulnerable, namely, at the apices, and particularly their inner portion along the vertebral border; and also at the apices of the lower lobes, or the outer portion of the middle lobe in adults, while in children the disease seems to extend most frequently outward from the roots of the lungs. Intensifying screens and a soft tube will give much detail with very short exposures. A tenth to a twentieth of a second exposure in very young children will usually be sufficient. In adults the fan-shaped arrangement of Dunham shows the distribution of the disease in the terminal bronchi, but it may not always be presented with the flat side toward the eye but only on edge. If one keeps in mind simply the terminal branches of the bronchi and looks for the lesion in such an arrangement, the diagnosis can often be made early. In many instances this will make a doubtful diagnosis positive and eliminate tuberculosis. Advanced tuberculosis can always be recognized by all methods of diagnosis. Extensive consolidation and cavity can be demonstrated clearly on plates or can be seen fluoroscopically. The extension of the disease from the apices toward the base of the lungs should always suggest tuberculosis, and the diagnosis should be definitely proved negative before given up. The infiltration, which is so frequently found extending into the lower lobe from the lower bronchial tree, is, Pfahler believes, very rarely tuberculosis, but is found commonly in chronic bronchitis. It is usually secondary to dust infection. Bronchiectasis must be considered in these conditions especially.

The three diseases which are the most difficult to differentiate from early tuberculosis are metastatic carcinoma, leukemia and syphilis. *Metastatic carcinoma* may often be distributed through the lungs in almost an identical manner. A general diffused infiltration by nodules may be present and may give evidence almost identical with general or disseminated tuberculosis, or it may occupy only the apices of the lungs, as in tuberculosis. Generally the disease spreads outward from the roots of the lungs or the mediastinum. It may, however, occupy any portion of the lungs and extend from this central source, presenting

² New York Medical Journal, July 14, 1917.

a more uniform appearance—in other words, a less mottled appearance. If the disease begins in the apices there is at the time an increased density very gradually shading into the surrounding tissues and, after a few months, the progression can be observed very positively increasing in density both in the original portion and the extension outward. There is very rarely, if ever, cavity formation, and the disease is more generally associated with pain. *Leukemia* presents a general mottling very similar to that of tuberculosis, but more apt to be general. This differential diagnosis may, however, seem unimportant to the average physician. During the past year a patient had been confined for six months in a sanatorium because she had a persistent cough, a moderate degree of anemia, and physical signs suggesting tuberculosis. A blood count had been made, but the differential count had been omitted. The chest had been examined, but a very large spleen and the abdomen had not been palpated. This showed great carelessness, as in most mistakes in diagnosis. *Syphilis* of the lungs is comparatively rare. The physical signs and symptoms are similar to tuberculosis; and the appearance of the lungs may resemble tuberculosis very closely. Here, again, the involvement of the lungs is more apt to be general, or to extend outward from the roots of the lungs rather than downward from the apices. *Bronchiectasis* must also be differentiated from tuberculosis. In its classical form the diagnosis is easy, when the cavities are large, and large quantities of sputum are expectorated. But a patient may have a persistent cough, moderate emaciation and considerable expectoration, in whom none of the classical symptoms are present. This represents the type in which there are many minute bronchial dilatations, which can be shown by stereoscopic observation. They give physical signs very similar to tuberculosis, but the disease is distributed more especially in the base of the lungs and above the lower bronchial trees, though it may involve even the upper bronchi.

Mary E. Lapham³ considers the *pathological etiology of tuberculosis*. Is it possible that the structural changes seen in the *x-ray* plates of cases not regarded as tuberculosis are in the nature of living autopsies and that we see in them the same truths as are revealed by positive tuberculin reactions and by autopsies? We shall have learned from the *x-ray* plates why these structural changes, so common in the bronchial glands and the lungs of healthy children, are not necessarily bound up with the evolution of any clinical tuberculosis. Our standard of diagnosis now in vogue is only adapted to advanced cases or to manifest ones, and these chiefly of the pneumonic type.

That interesting theme is ably worked out by Lapham to the following conclusions: *X-ray* plates teach us that tuberculous processes originate in the bronchial glands and extend into the lungs from them; that enlarged bronchial glands and thready infiltrations of the lungs are common in children and infants; that the development of these processes follows a more or less uniform type until secondary complications in the terminal areas of the bronchi occur; that in all probability these processes

³ New York Medical Journal, February 16, 1918.

begin in early life and persist throughout life, but that their presence is not necessarily, or even usually, associated with the disease we call tuberculosis; that the detection of structural changes in the lungs, either by *x-ray* plates or physical signs, or by both, does not warrant the diagnosis of tuberculosis as a disease; that we need a research study of the relationship of the perversions of functions in the vegetative nervous system and the ductless glands to occult tuberculous toxemias, before we can adequately recognize all the deviations from health which may represent a tuberculous etiology; that this knowledge is especially important for the comprehension of the children's diseases, since many of their functional diseases are secondary and symptomatic manifestations of occult tuberculous toxemias; that in all probability tuberculous processes do not originate at a definite time in consequence of a definite exposure, but that they begin their development in earliest life, persist indefinitely, and owe their dangerous features to causes not understood and greatly in need of research study; and that the best prevention of tuberculosis consists in the earliest possible recognition of the deviations from health caused by the assumption of pathological properties by tuberculous processes which are commonly present in the lungs and bronchial glands, and are usually harmless.

The Early Detection of Tubercle Bacilli in the Sputum. Valuable suggestions are offered by Dundas Grant in a letter to the *British Medical Journal*, vol. i, p. 100. In doubtful cases of laryngitis he has frequently been able to procure immediately a satisfactory specimen of sputum by syringing a small quantity of a weak solution of sodium bicarbonate into the larynx and trachea with an intralaryngeal syringe. This may pass muster as merely "washing out the larynx." The patient then coughs vigorously and in many cases can be induced to eject the liquid, with a pellet of sputum, into a basin. This procedure is advantageous when the secretion is inconsiderable and habitually swallowed by the patient instead of being coughed out. Again, in very anxious patients the sputum may be obtained in this manner without their being alarmed by the suggestion of the possibility of tuberculosis.

A yet simpler method consists in causing the patient to inhale the vapor of mustard oil. A few drops of strong aromatic oil of mustard are poured into an empty 6- or 8-ounce bottle. This may be corked up for about a minute to allow the vapor to fill the bottle, or be held for a few moments over a lamp. It is then uncorked and the patient is instructed to take "a good sniff" of it. After one or more good sniffs he generally begins to cough and expectorates any secretion that may be present in the larynx or trachea. If no cough takes place the probability of the existence of tubercle, at any rate of the larynx, is slight.

Differential Diagnosis between Lung Cavities and Pneumothorax. S. Zandren⁴ narrates an unusual case of which he has only found 3 similar ones on record. The patient, a woman, aged forty-four years, had been long under treatment for bilateral or chronic tuberculosis and pneumothorax of the left side limited by adhesions. At the postmortem

examination no pneumothorax was found, but the entire lung was practically converted into one huge cavity. To avoid similar mistakes the *x*-rays might be of service, but an exploratory puncture would be conclusive. In this instance a peculiarity of the clinical history was the absence of any serious hemorrhage or of much expectoration. The record of symptoms and of signs included attacks of pain in the side; dyspnea as a predominating symptom during the last few years, with occasional periods of collapse, fever and chills. Percussion gave a metallic tympanitic ring; the respiratory sound was amphoric, with rales only at the apex; and the roentgen examination seemed to confirm the mistaken physical diagnosis.

Pulmonary Tuberculosis or Valvular Disease? J. Tillman⁵ broaches that important question. For nine months his young female patient was treated for consumption, which the physical signs seemed to render unquestionable in spite of the negative sputum examinations. She died with symptoms of failing compensation. The necropsy revealed no tubercle anywhere, only passive congestion, with chronic catarrhal bronchopneumonia, but a valvular stenosis. The *x*-rays might have obviated that mistake. It is strange that mitral stenosis, the lung's chief immunizer, should, owing to hemoptysis, be one of the simulators of tuberculosis. Another young woman, with similar valvular stenosis, was sent to a sanatorium after a moderate hemoptysis, but the *x*-rays suggested that the lung trouble was only brown induration. The necropsy confirmed this assumption. Six other cases are described in which, under the influence of mitral stenosis, the lungs seemed to be the seat of tuberculous processes. The symmetrical aspect in the roentgen picture is striking. The more localized, spotty or cloudy aspect of tuberculous changes, along with the brown induration, are easily recognized.

The Present Status of Induced Pneumothorax. The *American Review of Tuberculosis*, November, 1917, contains two articles which reflect the uncertainty of the clinical question as to the adoption of this treatment and as to its duration. W. N. Beggs, of Denver, believes that it should be resorted to, generally speaking, much earlier than it is now. It should be used in all cases of recurrent, severe and protracted hemorrhage, and it ought to be considered in every case of actively progressive pulmonary tuberculosis in any stage. There is no doubt that it has restored to health many hopeless sufferers and has prolonged the lives of others. C. L. Minor, of Asheville, who has restricted its employment to chronic cases, more or less advanced, is of opinion that many cases are kept collapsed too long. The method is useful in cases of abscess of the lung, and in hemorrhage if we can trace which lung the blood comes from. In skilled and careful hands the danger should be small, if Forlanini's advice be heeded to inject slowly and under low pressure.

How to Avoid Tuberculosis. Otto R. Reichel,⁶ of the New York State health department, summarizes his views of the duties incumbent upon each individual free citizen. 1. It is your duty to stop careless spitting. Public sentiment against this dirty habit must become so

⁵ Nord. Med. Arkiv., October, 1917.

⁶ New York Medical Journal, January 26, 1918.

strong that nowhere will it be tolerated. 2. Do all in your power to keep the place in which you live and work absolutely clean, and especially to prevent dust. 3. Insist upon fresh air and sunlight at all times and in all places; become a fanatic on the subject. Fresh-air fanatics are very badly needed. They are specially needed on railroad trains, in drawing rooms, in many offices, and, alas, not only in many theatres but also in many lodges, clubs and churches. 4. Never occupy a new home until it has been thoroughly cleaned and aired. Prefer places that have exposure to sunlight. 5. It is almost superfluous to add, keep clean in body and mind; be moderate in all things; eat only plain, wholesome food; drink and smoke in moderation or not at all. It is best to abstain entirely. 6. Last of all, everything that you can do to make life healthier and happier helps to avoid tuberculosis—better wages, better working hours, better food at lower prices, playgrounds for children and adults, better factories, schools, homes and work places. We can do no better than try to live healthy, happy, and useful lives, and to assume a strict personal responsibility, as is our civic duty in a republic, to see to it that opportunities for these things are available to all the people, but especially to those less fortunate in life than ourselves.

The **Influence of Climate on Pulmonary Tuberculosis** was hardly mentioned in the recent debate of the Medical Society of London on the Value of the Sanatorium. But the following comment from William Gordon, of Exeter, shows that he still regards it as fundamental. "The true *preventive* treatment of tuberculosis is proper housing, wages and conditions of work. But sanatorium treatment as a *curative* measure might have done more for us than it has. It has been proved that our prevalent rain-bearing winds increase phthisis mortality among the populations most exposed to them, and with much probability that they are injurious to tuberculous patients. Yet has any care been taken to choose sites for sanatoriums where they are sheltered from these winds? Little wonder that the results in some of the sanatoriums erected during the last two decades have been disappointing. The Germans, who recognized and used the discovery of an Englishman (McCormac, of Belfast), made better use of open air. Görbersdorf, in Silesia, where Brehmer built his sanatorium in 1862, lies in a well-sheltered valley. Nordrach, in the Black Forest, where Walther misled his English visitors with the myth that he laid no stress on climate, stands in a well-sheltered valley which he had carefully chosen after months of search, as he admitted to me. On the other hand, the Falkenstein sanatorium, looking out west and south from the slopes of the Taunus, was not a success. If we built our sanatoriums, as we ought to do, on quickly drying soil, under moderate rainfall, in pure, dustless, fogless air, with abundant sunshine and protection from wind, particularly from rainy wind, and at least a quarter of a mile inland from the sea, selecting preferably a district of known low phthisis mortality, our results would be much better than they are and we should not now be in danger of running from one extreme of opinion to another. Sanatoriums, I am convinced, are valuable where properly situated. Where wrongly situated, I believe they may be worse than useless."

Phthisis and Cancer in a Rural District.—The *British Medical Journal*, January 5, 1918, publishes a table received from a parish in the south of Scotland for the period from 1880 to the present year. The parish is purely agricultural, the old industry of stocking weaving being now extinct. The population of the parish was 1015 in 1891, 939 in 1901 and 865 in 1911. The following figures, showing the deaths from the two diseases in the periods mentioned, may be of interest for the purpose of comparison:

Period.	Pulmonary tuberculosis.					Cancer.				
	No. of deaths.	M.	F.	Average age at death.	No. of deaths.	M.	F.	Average age at death.		
1880—1890 . . .	44	13	31	M. 31 F. 29	5	2	3	M. 67.6 F. 65.4		
1890—1900 . . .	26	9	17	M. 34 F. 29	13	6	7	M. 70.0 F. 69.0		
1900—1910 . . .	16	8	8	M. 35 F. 27	8	4	4	M. 61.6 F. 72.0		
1910—1917 . . .	10	3	7	M. 34 F. 26	6	1	5	M. 74.0 F. 51.2		
Totals . . .	96	33	63		32	13	19			

"The statistics are typical of what we are accustomed to see during the past four decades, namely, a large reduction in the number of deaths from tuberculosis (pulmonary in this instance, with one or two cases of tuberculous meningitis and peritonitis) and a slight increase in the number from cancer. The average age at death is typical of the two diseases, and the preponderance in the number of female cases is striking, also the greater age of the male cases."

Rest in the Early Treatment of Pulmonary Tuberculosis. A. E. Prest's⁷ advocacy of Rest has elicited from Adam Moss,⁸ of West Kirby, a statement of his experience in the north. He treats such cases with tuberculin and lets them go about and obtains a cure in practically every one. "Even in comparatively advanced cases, with a temperature of 100° or 101°, I do not insist upon absolute rest. They come to me twice weekly for injections, and rest as much, and exercise as much as they feel inclined. Three years ago a man came to me from a sanatorium which he had entered eight months before as a very early case. His temperature was 101° and the disease so far advanced that I thought it was hopeless to expect a cure. In six months the temperature was normal, and at the end of twelve months I had worked up his dose to 1 c.c. of old tuberculin. He was then without cough or expectoration and physically absolutely fit. He has done his full work for eighteen months without a day's illness. By all means let the leaders of the profession lay aside prejudice and the rank and file learn how to use tuberculin. I follow Camac Wilkinson's method and I am more than satisfied." The practical conclusion we might once more draw is that the prevalent sanatorial principles for the treatment of early cases, which it is the sanatorium's special business to cure, are still inconclusive, are demonstrably at fault in some essential; and are urgently in need of a

⁷ British Medical Journal, 1918, vol. i, p. 444.

⁸ Ibid., p. 497.

radical reconsideration. No treatment by routine is admissible until it has justified itself by a routine of success. The principle of rest has had a long trial. It has not yet completely justified itself by its results.

A Consideration of the Local Processes of Disease and Repair in the Treatment of Pulmonary Tuberculosis. Free utterance is given, in a thoughtful paper by H. Morriston Davies,⁹ to the truth, seldom acknowledged, that the sanatorium, while it has unsurpassed opportunities, has never utilized them for the elaboration of any active curative therapy of its own. It has merely borrowed, and admirably engineered, the elemental forces provided by Nature—open air, sunlight, wholesome food and rest *sub tegmine*. We cannot say that in the cases treated by sanatorium methods a complete and permanent cure is the normal outcome. His purpose is to indicate some principles which that treatment ignores, but which are indispensable for framing a method in any sense definitive. The tubercle bacillus in man is an organism of slight general toxicity and slight local virulence. In the tissues it has comparatively little direct destructive effect, but rather stimulates them to produce a special tissue, which is to surround and destroy the invading microorganisms, *viz.*, granulation tissue, the well-known granuloma. This has no feature peculiar to tuberculosis; it is the normal response of the body to a mild continuous irritation. The function of the granuloma is to destroy the irritant and, when its work has been accomplished, to be converted into fibrous tissue. If a few tubercle bacilli be introduced into healthy tissue the normal events are the formation of a granuloma around them, their destruction by the granuloma and the direct development of the latter into a small healthy scar. What are the conditions necessary to ensure this sequence? (1) *The general resistance* of the patient to tuberculosis must be good; (2) *the dose of the organism* must be reasonably small; (3) the part infected must be kept under local conditions favorable to cure, by far the most important being rest. Failing these, the granuloma fails as a protective mechanism and becomes an agent of injury by its progressive enlargement. The granuloma attacks and destroys the surrounding healthy tissues like a malignant tumor. That destructive effect is part of the active defence; but it is not equal against all tissues. It is restrained by any dense fibrous membrane and by the parietal pleura. The granuloma draws its blood mainly from capillaries, larger vessels being very imperfectly developed. As a consequence, while it enlarges, the central parts perish by caseation and liquefaction. Before caseation has occurred, conversion of the granuloma into fibrous tissue is still possible and recovery follows without loss of substance by excavation. The lesion then closely resembles the syphilitic gumma rather than the traditional caseous tubercle. The resulting fibrous tissue tends to contract, and to diminish the volume of any part affected, even when free from caseation and loss of substance. Diminution in volume of the lung is thus an essential for recovery from phthisis. But, if the chest walls, costal, phrenic and mediastinal, do not fall in, the contraction tends to pull on the walls of the intrapulmonary bronchi,

⁹ British Medical Journal, April 6, 1918.

setting up a distortion and dilatation which may prove as disabling as the primary disease. Three lines of treatment are indicated by these pathological factors: (1) To raise the general resistance; (2) to supply the local conditions most favorable to the healthy evolution of the granuloma as a defensive mechanism; (3) to favor the contraction which accompanies all healthy scar formation.

Sanatorium treatment, as such, concerns itself solely with increasing the general resistance by the avoidance of reinfection and of mixed infections, by hygiene, and by exercise. The manifest improvement in the general health does not always bring about a like improvement in the disease. It is probable that the comparatively limited number curable by sanatorium treatment are those of good resistance and who are nearly or quite able to dispose of the infection in its earlier stages, after their temporary depression by ill health.

In cases of so-called surgical tuberculosis in parts subject to movement, immobilization suffices, without any other treatment, to render the granuloma completely effective as a defensive mechanism. There is no reason to suppose that it might not be equally applicable to the mobile lung; although general treatment alone is sometimes effective in spite of its continued movement, probably because its vascularity renders it naturally unfavorable to the disease. The immobilization of a tuberculous joint, to be efficient, must be absolute, and the same may be expected to apply to the lung. This is only obtainable in a collapsed lung. To that end four methods are available: Their effect is to put the whole or part of the lung either temporarily or permanently out of action and, at the same time, to compensate for the mechanical disabilities arising from the morbid changes. Two of these methods have for their object the collapse of the whole of one lung; they are *nitrogen displacement*, which collapses the lung only, and *rib mobilization*, which collapses the lung together with the chest wall. The other two influence a part of the lung only; one is *division of the phrenic nerve in the neck*, which produces paralysis of the diaphragm and is followed by immobilization and a partial collapse of the lower lobe; the second is the *local replacement* of part of the lung, usually the apex, by a foreign body (Tuffier).

An extensive invasion of both lungs by tubercle is the only contraindication which Davies recognizes to the treatment by nitrogen displacement. So long as the case is an "early" one, the diminution in volume can be balanced by the enlargement of the healthy lung. There is no *necessity* for further artificial means. But, if the symptoms and the signs indicate that there is delay or incompleteness in the fibrosis of the granuloma, complete rest of the lung by surgical intervention is undoubtedly indicated. The longer it is postponed, the more probable is it that the collapse of the lung will be incomplete or impossible owing to adhesions. Interpleural fibrosis often interferes greatly with the treatment. If, however, any existing adhesions are few and are accessible for division, or can be stretched sufficiently to enable the lung to be reduced to about half its volume, great benefit may be expected from partial collapse. The remaining methods are briefly sketched. Division

of the phrenic nerve in the neck is of special value: (1) When there are extensive secondary changes (mechanical and infective) in the lower lobe; (2) to diminish movement in the lower lobe when it is the seat of primary tuberculous disease; (3) to prevent the aspiration of infective material (tuberculous or pyogenic) from the upper into the lower lobe; (4) as a prophylactic measure against the development of bronchiectasis in cases of chronic interstitial pneumonia.

RESPIRATORY INFECTIONS OTHER THAN TUBERCULOSIS.

The Phenomena of Purulent Bronchitis. J. C. McWalter,¹⁰ of Dublin, makes the suggestion that many cases hitherto classed as pneumonia of a peribronchial type were really instances of purulent bronchitis. These patients had a very rapid pulse, exceedingly frequent respiration, painful, whistling cough, high temperature, headache, profuse expectoration, sometimes purulent, sometimes prune-juice-like, and the worst of them had a heavy heliotrope hue of the lips and even of the face. The clinical signs of pulmonary consolidation were indeed sometimes wanting, but the patients were too weak and distressed for frequent examinations and the rapidity of pulse and respiration seemed to justify a diagnosis of pneumonia. It is suggested that the lesion is really a pneumococcal infection supervening on influenza. Postinfluenza pneumonia is so convenient and generally accepted that we are tempted to put this diagnosis on many doubtful cases; but he submits that the disease is due to a mixed infection, and is rather an acute pneumococcal septicemia than a mere pneumonia following influenza. Those under his care were all suffering from some mixed infection, but not necessarily of influenza. They had had malaria, or dysentery, or some form of sepsis. None of the fatal cases were very young. Their lungs were not absolutely free from solid patches, but the parts chiefly affected were the bronchioles from which gray frothy pus exuded. The affection is far more fatal than ordinary pneumonia and the influenzal type is generally contagious. Hence the necessity for early diagnosis and isolation treatment. Stimulants given freely, with oil of wintergreen externally and stimulating expectorants combined with nux vomica and gum resins, seem to be useful.

Latent Pulmonary Syphilis. Leredde¹¹ urges that the most common form of all has hitherto escaped recognition, and that many instances of bronchitis, pulmonary congestion, emphysema, dyspnea or of asthmatic symptoms are traceable to acquired or to congenital syphilis. He bases that statement upon his clinical and urological observations in a series of 20 young soldiers, 10 of them bearing undoubted stigmata of congenital syphilis while 7 gave a positive Wassermann reaction, and 3 were most probably syphilitic. He attributes the pulmonary symptoms to a progressive sclerosis of the lung tissue, gradually extending to the bronchioles and smaller bronchi, and thus establishing a predisposition to the common varieties of bronchial infection and also to

¹⁰ British Medical Journal, January 26, 1918.

¹¹ Presse médicale, September 15, 1917.

tuberculosis. A correct diagnosis is now within the reach of our searching laboratory methods, and efficient measures of treatment are amply available.

The Dublin Treatment for Syphilis. J. C. McWalter's¹² spirited attack upon the modern therapeutical craze is interesting reading and most opportune at this stage. The Old Dublin method, that of Donovan, was scientific. Often chemical agents assist the organism to overcome the effects of syphilitic poison. To assume that they directly kill the causative agent is unsafe. Such a theory suggests that big doses of arsenic, mercury, iodine or of any potent chemical can more quickly kill than the disease they are planned to cure. Donovan gave minute doses of drugs which experience had shown to have some beneficial effect on the disorder—mercury, arsenic, iodine—all combined in an active and compatible form. One knows now that nature's method against a disease is one of physiological action. Gradually the defensive forces must produce antibodies, and at the same time agents which must fortify the body against similar raids. In Donovan's solution the action is defensive and is reinforced by small tonic and alterative doses of arsenic and iodine. There is no attempt at sterilization, only an effort to help nature. Granted this method is slow, it is safe.

Under the new treatment it is said that the stay of men in army hospitals is only sixty days; it was a comparatively rare thing for a man under Donovan's treatment to be a single day in the hospital. Its advocates admit that patients have actually succeeded in getting the disease again. Could anything be more pathetic? They then appeal to a further fallacy. The Wassermann reaction tells when the patient is cured. But the Wassermann is, in its essence, a mere hemolysis, depending on the presence of certain abnormal elements in the blood. A positive reaction may mean that the patient's blood has some syphilitic virus, or that it has some abnormality resulting from the administration of arsenic or other poison. One dose was at first expected to cure the disease. Now we give five, six or seven doses, and to make sure we also give mercury and potassium iodide; even then we are doubtful if we have cured it. Are not grave dangers inherent to the administration of enormous doses of arsenic? First, one must remember that very little has hitherto been known of the intravenous administration of poisons. When it was found that 6 grains of an arsenical compound could be given intravenously without causing poisoning, this was thought due to some peculiar non-toxic charm of Ehrlich's compound.

The intravenous effects of antimony are absolutely different from the intra-oral. Thus over 1 grain of tartar emetic could be injected into the vein without the slightest emetic effect. A dose of over 2 grains was alike inert. In fact, one can apparently give with impunity enormous doses of certain poisons by the intravenous route. It was found that there was no apparent difference in the effect whether arsenic or antimony were administered. Although no immediate ill-effect may occur, the poison has to be eliminated or grave results may follow. Even in

the earlier days of Ehrlich's cure there were undoubtedly cases of optic neuritis. Some colic, vomiting, transient nephritis or enteritis are almost taken for granted. And there are other risks. If a patient has had malaria, dysentery, nephritis, cardiac or pulmonary trouble he seems to run a special risk. Again, there appears to be a distinct danger of infective break-down. If arsenic has been administered, it will be stored up in the liver. But, obviously, the liver cannot normally discharge its many defensive functions if it be saturated with arsenic. It is submitted that the modern method is by no means the proved success that is presumed. It is suggested that distinct danger is involved in many cases, and especially when imitations of the original preparation are employed. We should not forget, in assessing the value of any treatment, that the modern disease is comparatively mild in its manifestations, even without any special treatment. Finally, the recent demand not to apply any antiseptic treatment to a sore until it has been examined microscopically is most mischievous. This involves a delay of twenty-four, forty-eight or seventy-two hours. During all the time the disease is entering the system.

The Treatment of Hay Fever. In an editorial note in the *British Medical Journal* the following suggestions are given for the treatment of this condition: Sir St. Clair Thomson recommends quinine in a spray (gr. $\frac{1}{2}$ to $\frac{3}{4}$) or ointment (gr. xxx to $\frac{3}{4}$ j of vaseline); Watson-Williams states that at the beginning of the hay-fever season the nasal passages should receive one spraying with a solution of mercury biniodide (2 to 5 per cent.), the application being preceded by cocaine and followed by a hypodermic injection of morphine. Sir Andrew Clark paints the nasal mucosa with the following solution: Glycerin of carbolic acid $\frac{3}{4}$ j, quinine hydrochloride $\frac{3}{4}$ j, mercury perchloride gr. $\frac{1}{4}$. Its use, which should be preceded by the application of cocaine, is often followed by considerable reaction. If necessary, it may be repeated on the second to the fourth day, but not more than three applications are required.

Posterior Adenoiditis as a Primary Factor in General Infections. G. Rosenthal and J. Cheville¹³ publish this generalization, as a practical outcome from their investigations in cases of cerebrospinal meningitis developing in a military garrison. Cytodiagnosis showed definitely that posterior adenoiditis is the primary lesion and antedates the intraspinal suppurative process. The adenoiditis being quite painless is overlooked, and intraspinal specific therapy is applied for a nasopharyngeal infection, which only secondarily involves the spinal membranes. More recent studies demonstrated to them that many widespread infections, apparently without localization, are likewise the result of posterior adenoiditis due to various microorganisms, with subsequent septicemia or secondary foci. Nasopharyngeal swabs obtained by Dopter's method, originally intended for the detection of carriers, enabled them to separate such diffuse infections into two groups, the first without, and the second with, adenoiditis. In the first group there are few cells, chiefly epithelial, with only occasional bacteria. In the second, many polynuclear cells

¹³ Presse médicale, October 27, 1917.

are found, with marked changes in their nuclei and protoplasm. A simple smear suffices to show a single predominant bacterial organism, *e. g.*, a coffee-grain Gram-negative organism, often micrococcus catarhalis; numerous small bacilli, Gram-negative and staining with difficulty, as Pfeiffer organisms, or candle-flame, Gram-positive diplococci, pneumococci or enterococci. Culture methods can supply a more precise microbial formula. Repeated nasopharyngeal cytodiagnosis permits of tracing out the course of the disease prognostically. Local treatment by disinfection with Vincent's solution for carriers and intranasal injections of oil with eucalyptol, gomenol or resorcinol by means of Marfan's syringe shorten and mitigate the infective process in these cases of "grippe without localization," by acting upon the original focus of the disease.

Vincent's Angina and Peridental Gingivitis. F. E. Taylor and W. H. McKinstry¹⁴ call attention to the fact that this intimate association was described by them in a paper on "Fusospirillary peridental gingivitis," published in the *Proceedings of the Royal Society of Medicine* in 1916, where the differential diagnosis of fusospirillary peridental gingivitis and pyorrhea was discussed, much confusion having resulted from the laxity with which the term "pyorrhea" has often been employed. These two conditions may coexist. The same subject was also fully dealt with in another paper,¹⁵ in which they stated that "as the result of our investigations we suggest that when a patient complains of a sore throat which presents the characters of Vincent's angina it is essential to examine the tooth margins for evidence of peridental gingivitis or pyorrhea, and that smears be made from both sources for the detection of the causal organisms. When found to be present the peridental gingivitis should be adequately treated, as well as the Vincent's angina, otherwise the condition is likely to persist indefinitely and to cause repeated recurrence of the sore throat."

Sterilization of the Throat after Diphtheria and in Carrier Cases. M. Esther Harding¹⁶ corroborates W. S. Thacker's advocacy of the use of silver nitrate solutions. For carriers, Thacker used a 50 per cent. solution, and two applications procured sterility in every case. A 90 per cent. solution was employed for the staff, and one painting, cocaineized beforehand. This is not free from danger. As most of Harding's patients were children, the first painting was done with a 1 in 8 (12.5 per cent.) solution. When this did not secure sterility, a second painting was done with a 1 in 4 (25 per cent. solution). In 4 cases this proved insufficient, and further painting was needed. These were all children with enlarged tonsils and adenoids, occasioning difficulty in reaching every depression and irregularity. Each child was rolled in a blanket so that it could not get its arms free and laid across the bed with its head in the operator's lap. This position prevented any excess of the solution running down the throat. A strip of cotton-wool, wound round the long sinus forceps, was used for the application of 30 to 40 minimis of the solution. The tongue was depressed and the tonsils and posterior

¹⁴ British Medical Journal, 1918, vol. i, p. 101.

¹⁵ Ibid., 1917.

¹⁶ Ibid., January 5, 1918.

pharyngeal wall swabbed somewhat firmly with the silver nitrate. It was found advisable to keep the patient without food for two or three hours beforehand, the only case of laryngeal spasm having occurred in a girl who had had a meal shortly before.

The Handkerchief Drill for the Prevention of Adenoids. This is one of the invaluable, though lay and untutored methods, which Mrs. Hancock is practising and teaching in London for the benefit of schools and clinics. In blowing the nose the thing to avoid is any compression of the nostrils; the thing to learn is to grip, instead, the incompressible bone high up at the bridge. The drill is simple and quickly mastered by small children: One! "Grasp the root of the nose between thumb and finger." Two! "*Raise the elbow* to shoulder level." Three! "Repeat this with handkerchief fully spread over the hand." Four! "Blow and then breathe in through the nose." Five! All to keep blowing and breathing, alternately and in unison, until the call is "elbows down." The rationale is obvious; why never taught before? Nostril compression during the blowing delays the mucus output and drives some of it back under high pressure into all the nasopharyngeal recesses, into the antrum, into the Eustachian tube and into the excretory mucous ducts of the tonsils. To clean the mucous membrane one blowing is not enough. Nose blowing should be renamed "nose-pumping," as a preventive and as a curative device. Mrs. Hancock is convinced by her experience that when this method is universally adopted, and practised from an early age, in addition to her other devices, the necessity for any operation, whether tonsillectomy or adenectomy, will become quite exceptional.

PHYSICAL SIGNS AND METHODS.

The Correlation of the Diagnostic Ear and of the Musical Ear.—Does every medical student or practitioner possess what might be termed the diagnostic ear and the power to discriminate pitch, which is an essential in diagnosis? The answer given by Cyrus Hamlin¹⁷ is decidedly in the negative. Many individuals cannot catch a tune or keep on the key. The diagnostician has a harder task than the musician, for he is dealing with a noise that is not clean cut, and in many cases the sounds are almost inaudible. On the other hand, the musician is above all a pitch specialist. For the past year Hamlin has adopted a novel procedure in percussion and auscultation. It consists of converting the pitch of the sound obtained into its equivalent in a musical note, and the term "corroborative auscultation and percussion" has been suggested for it. Such terms as resonant, hyperresonant, cracked pot and tympanitic define the quality of the sound but tell only half the story, their pitch being usually designated as high or low. To one possessing a discriminating ear this is not exact enough. The true pitch should be ascertained and recorded. Corroborative percussion is most applicable in the diagnosis of incipient tuberculosis at the apices of the lungs. On percussing over the clavicles of a normal subject, their difference, when

¹⁷ New York Medical Journal, March 30, 1918.

translated into musical pitch, amounts to half a tone. A greater variation than this should be regarded as suspicious and kept under observation. Most intelligent people have sense enough to consult a dentist twice a year for safety. The lungs surely are not less important than the teeth! In the first stage of a tuberculous process of the lungs, and in various pneumonic conditions, the pitch on auscultation and percussion is more or less deterministic in value; yet who can recall it even after a few moments have transpired? Likewise in pleurisy with or without effusion. In tuberculosis characterized by inflammation and hyperplasia of the pleura, the dulness, equivalent in musical pitch, averages two notes lower than that of the normal side. But in pleurisy with effusion the pitch is four or five notes lower; and as recovery takes place the pitch is gradually raised until it comes within half a tone of the normal, where it remains stationary for some time. In cases in which bronchiectasis, gangrene or abscess is engrafted on the original lesion, corroborative percussion has been found of great assistance in diagnosis. The extent and amount of dulness must be ascertained and accurately measured for future reference. The special senses are deceptive. A careful practitioner consults his hemoglobin scale in blood examinations if he is progressive, and has any respect for exactness. If we have found it useful to keep a permanent record of what we see the same principle should apply to what we hear. A description of the procedure and instruments used in corroborative auscultation and percussion will be given in a subsequent paper. But it should be understood that the ear has to undergo special training in order to catch the pitch of sounds elicited on percussing the various viscera and structures of the human body.

Stethoscopic Electrovibratory Percussion. Under this heading A. L. Benedict¹⁸ recalls his early publication in 1895 of a similar device. The principal indication for using electric vibrations was to secure a more even and continuous sound than by the finger or other purely mechanical device and to obviate the inconvenience of the tuning-fork in regard to brevity of vibrations of sufficient intensity. While in Paris in 1908, he had a large, deep-pitched tuning-fork fitted with a hard-rubber handle; this produced vibrations of sufficient intensity and duration for most examinations, at most requiring two or three blows for mapping out any single organ or area. He has not used the electric vibrator to any extent since. He notes in the same connection the soft-rubber whips of Abrams; Peter's plessigraph, a hard-rubber stem for transmitting finger percussion, ordinary lead-pencils with and without rubber tips; a partly successful original experiment with a padded dental plugger; more or less accurate results from a watch, the trouble being rather with the size of the object than the acoustic quality of the ticking; very beautiful effects by combining coin percussion with the stethoscope; and occasional instances in which a distended stomach has rendered the patient's own heart available as percussor. All sorts of substitutes for digital percussion have been tried. Occasionally quite extraneous noises may enable one to map out an organ.

¹⁸ New York Medical Journal, September 22, 1917.

An important factor of success in auscultatory percussion and the allied method of visceral transonance is the stethoscope. No general principle in this regard can be formulated except to try in any given examination to get the best results. For example, he uses an ordinary Cauman instrument, or at times some kind of monaural tube, and attaches soft-rubber tubes by means of a hard-rubber Y to chest pieces of various sizes. His favorite instrument has ear-pieces made of the ends of a hard-rubber thermometer case, sawed off and bored at the ends; and the chest-piece consists of a cylindrical vaginal syringe tip, sawed off and polished. For the heart his instrument is made of two rather large metal tubes, one sliding in the other, the distal tube cylindrical and the proximal fitted with a cap with a central opening to receive the Y of the tubes leading to the ear. By sliding the tubes in and out this instrument can be set to resound approximately with the percussion notes of the heart, or with those of the valvular closures when simple auscultation is performed, or with the tuning-fork for mapping out organs generally. For some reason the phonendoscope with stem did not give good results, nor has the attempt to use the electric telephone receiver succeeded.

For the value of auscultatory percussion he can only say that a certain area represents a structural unit, such as a given organ. But areas of consolidation or cavities in the lung or accumulations in the thorax or abdomen, etc., may also be made out. Occasionally a definite resonant unit exists within some other organ than the lung. For instance a hepatic cancer localized within the general liver area was determined by ordinary percussion and palpation. Auscultatory percussion could only determine that there was a definite unit of different conductivity from the rest of the liver, but the inference was almost positive from other indications and was confirmed by necropsy. Similarly, auscultatory percussion has determined, in the same suggestive sense, abscess and hydatid cyst. Again, auscultatory percussion has determined abdominal cyst as against ascites; the translucency test, size, position, etc., pointing to the correct diagnosis of an intraligamentary cyst. Auscultatory percussion may, in some cases, determine whether a bone is fractured or not, the main requirements being a sufficiently large bone so situated that fairly direct contact can be secured.

The electric vibrators have not given him better results than digital percussion, or the plessigraph of Peter, or the tuning-fork; but it may be that Hickey's instrument is a decided improvement upon those that he had employed. In 1907 he originated the bismuth method of locating the stomach by *x*-rays, Roux, of Paris, having anticipated him without his knowledge by a few months; and he has often checked auscultatory percussion findings by *x*-rays.

Gottschalk's Heartphone, an electric stethoscope "now thoroughly tested," is briefly described by C. C. Henry¹⁹ as a simple means for accurate physiological and clinical auscultation, small enough for the pocket. The component parts are a transmitter, a receiver, a battery,

¹⁹ New York Medical Journal, January 26, 1918.

a regulating controller and a free vibrating diaphragm, which transmits the sounds unhampered to the receiver. The sounds pass on to the ears through soft-rubber tubes protected by metal tubing. A sound-regulating controller is placed on the cords between the transmitter and the receiver. This controller consists of twelve resistance units, with a thumb slide, giving a range of adjustment to suit the individual and enabling the examiner to cut out the louder sounds if only the minor ones are under study. For practitioners with defective hearing the heartphone is invaluable, as sound is clearer and more penetrating when conveyed electrically. Sounds that cannot be heard by means of a mechanical stethoscope may be heard by the use of this instrument. Henry believes that it will do all, and more, than the air-conduction instrument can do, and with greater reliability.

The Differential Stethoscope as an Aid to the Diagnosis of Myocardial Changes. O. Leyton's paper in the March issue of the *Practitioner*, 1918, is a further instalment in his advocacy of the clinical value of this stethoscope, already noted in last September's report. In a patient complaining of symptoms suggesting valvular disease the usual function of stethoscopy is to confirm the diagnosis obtained by methods other than auscultation, as to which valves are diseased, and how diseased. That does not, however, represent the full scope of its utility. Take the instance of a child admitted, in early rheumatic fever, with incipient alterations in the myocardium, pericardium and endocardium. A mitral murmur develops, due to dilatation. Under treatment the fever subsides, the heart returns to normal size and the murmur disappears. Some months later a presystolic murmur is noted, and this persists indefinitely. It is now due to adhesion of the mitral flaps. The child may not have any *symptoms* of cardiac mischief. At that time the stethoscope would supply the sole evidence of valvular disease of the heart. Other signs and symptoms will develop later.

Incidentally, Leyton protests against the tendency to ignore valvular incompetence. It is true that many systolic murmurs heard over the mitral area are not due to mitral incompetence. These have had many names given to them, under the main heading of "functional" murmurs, and for the last thirty years the growing fashion has been to treat them with contempt. Valvular incompetence means a heart with diminished efficiency. Because there are many with mitral incompetence, who are able to lead strenuous lives without discomfort, we are not justified in holding that the valvular lesion is of no importance. It is manifestly a fallacy to assume that because they are able to perform a certain amount of work without distress that amount of work repeated frequently will prove harmless. Others, too, may have drunk a bottle of whisky a day for years who still apparently enjoy perfect health; but we do not advise the postponement of abstinence until cirrhosis of the liver has made itself evident. Shall we then advise a patient suffering from mitral incompetence not to diminish any strain thrown upon the heart before there is evidence of a disordered circulation? In both cases, when the damage has been done, it is beyond repair, but for neither is there any method to determine whether the particular patient

under consideration will prove to belong to the favored class which can reach old age in spite of the abnormal condition. The main thesis of the paper is that certain alterations in the sounds of a heart which is free from murmurs may indicate myocardial changes. This is nothing new; the tic-tac rhythm of hearts affected by toxins was demonstrated to him as a student. There are many intermediate stages between the normal sounds and the so-called tic-tac, and the sounds alone can assist us in their diagnosis and prognosis. This he proceeds to emphasize by two illustrative cases. (1) A well-built man, aged thirty-five years, complained of occasional faintness and sometimes fainting and of pain in the chest. Several physicians had diagnosed dyspepsia. One had examined him with the electric cardiograph and told him that his heart was weak. On examination the first sound at the apex and the second sound at the base were of equal intensity, whereas the *first sound at the apex should have double the intensity of the second sound at the base.* This led to the diagnosis of myocardial degeneration. The polygraphic tracings taken did not demonstrate any morbid condition, the search for microbial infection proved fruitless, but the Wassermann test was positive. The man died from syphilitic myocarditis before antisyphilitic treatment could be carried out. (2) A woman, aged thirty-two years, had consulted him nine years ago. She had just seen an eminent physician (whose death was lamented several years ago) who had told her that she had degeneration of the muscle of the heart and could not live more than seven years. In this case the differential stethoscope failed to show any evidence of myocardial degeneration. How could he reassure her? "The following suggestion proved of value: I told her to return to Sir X. and ask him to consent to a deed being drawn up to the effect that in exchange for my paying him £50 per annum for seven years he or his executors should pay me £100 a year after the seven years until her death. The woman is alive and well today."

The differential stethoscope has to be manufactured with extreme care. Every detail in its mechanism is of importance. It consists of an aluminium box, divided into two chambers by a sound-proof diaphragm, which is pierced in its center by a sound channel, through which the heart sounds pass *en route* to the observer. Into this sound channel fits an obturating cone, which can gradually be withdrawn and replaced by turning a small disk. When the cone is withdrawn it creates an annular sound channel of variable area. The range and relative sizes of these areas are the important feature of the instrument. The area is governed by three factors, *viz.*, the size of the channel, the angle of the cone and the amount of its withdrawal. If these factors were so arranged that the cone was entirely withdrawn by one revolution of the disk, the relative values of the sounds which would disappear at the ten main points indicated on the dial, would be 1, 1.02, 1.04, 1.1, 1.2, 1.3, 1.5, 1.9, 2.7, 5.2: that is to say, that the disappearing points of the sounds on the instrument would be wide apart on three quarters and then cramped together on one-quarter of the dial; such a chest-piece therefore would be insensitive. But, if the instrument is constructed

with a suitable arrangement for the proper size of the air channel, for the proper angle of the cone (which should be very acute), and for the proper amount of its withdrawal, the range indicated on the dial would be approximately 1, 1.1, 1.2, 1.4, 1.6, 1.9, 2.3, 3.2, 4.7, 9.4. This range has been found excellent in practice.

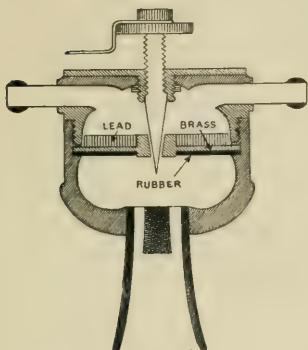


FIG. 1

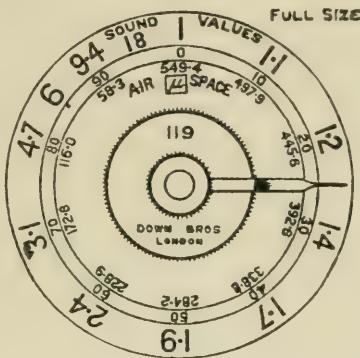


FIG. 2

The air channel differs slightly in every instrument; this is partly due to the tuning of the instrument after its construction. No two instruments are therefore exactly alike, and the above range will occasionally vary in one or two of the decimals. Each instrument, after manufacture, is carefully tried, and after its sound-conducting powers have passed the necessary tests the area of the annular sound-channel at each of the points on the dial is calculated and recorded in square micromillimeters. The reciprocal of these areas is also recorded in

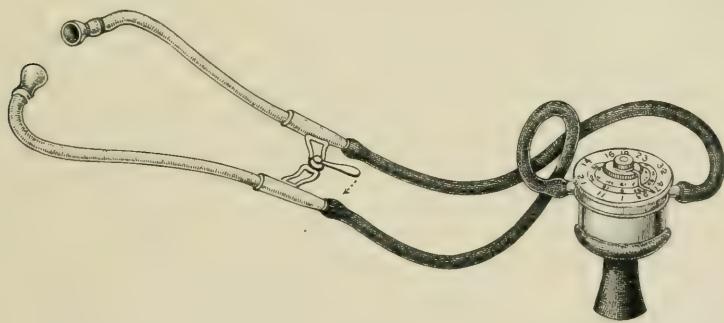


FIG. 3

large plain figures on the dial. These figures give the exact relative value of the sounds which disappear at these various points. The true centering of the diaphragm is of extreme importance, and therefore the chest-piece should not be taken to pieces except by a mechanic who has become an expert in assembling this instrument.

In order that observations may be accurate, the chest-piece is attached to rubber tubes at least 2 feet long, preferably of not a very thick wall. Out-patient physicians use rubber tubes of this length, because it is rather more than that of the jump of an average pulex irritans. But the special object is to permit of the movement of the chest-piece from one area to another without moving the ear-pieces. The tubes should be attached by means of a locking nut rather than a spring, so that the ear-pieces may be fixed in the ears and the risk of their shifting be reduced to the minimum. The purpose of a relatively thin rubber tubing is to prevent the conduction of sound along its walls; the sound should be air-borne only. The method of using the instrument is to open it one complete revolution, to fix the ear-pieces into the ears, to apply the chest-piece to the apex of heart and then to slowly turn the disk in the same direction as the movement of the hands of a clock until the first sound is no longer heard. On moving the disk back a little the first sound is heard again. The position of the pointer at which the sound is first lost is recorded. The stethoscope is then opened one revolution again and applied to the aortic site, and the disk slowly moved until the sound is just lost. The position of the pointer is recorded. If the heart is normal it will be found that the intensity of the first sound at the apex is double that of the second sound at the base. Of course the intensity of the sounds may be compared at any other sites, but, so far, the most attention has been given to the apical first and to the aortic second.

When the ratio of intensities of the apical first sound to the aortic second sound departs greatly from 2.1, one may suspect an alteration in the myocardium; this alteration may be of a transient nature. Leyton submitted the instrument to the following test: The ratios of the heart-sounds of 8 soldiers were recorded without his being told anything about them except that they had all been labelled "soldier's heart." He found that only one of these had a variation from the usual 2.1, and this was 1.1. This soldier had had dysentery; the other 7 were cases of circulatory trouble following severe shock. That toxins lead to alteration in the relative loudness is easily demonstrated by taking a differential stethoscope to a fever hospital. Diphtheria and scarlet fever will be found to have a very distinct effect, fortunately transient. Possibly the differential stethoscope is the best guide in determining when a patient may get up without running any risk of dilatation of the heart or graver consequences. But it must not be concluded that, because the ratio of the heart sounds is not modified to the greatest extent in those that have apparently had the most severe attacks, therefore the instrument is fallacious. The susceptibility of the heart muscle differs in different individuals; one man may have a comparatively light attack of diphtheria and severe alteration of the heart muscle; while another may have much membrane and swelling, leading to the necessity of tracheotomy, and nevertheless the heart muscle may escape. The effects of antitoxic serum must be considered. Postdiphtheritic paralysis, too, is not limited to the severest cases. It cannot be too strenuously stated that the differential stethoscope is only one of the

several methods of determining myocardial degeneration; possibly not the best, but apparently the most convenient known at the present time.

The main criticisms have been that: (1) The instrument does not measure sound values; (2) the intensity of the heart sounds depends so much upon the thickness of the chest wall that the measurement is valueless; (3) the intensity of the heart sound bears no relation to the condition of the heart muscle; (4) the heart sounds depend upon so many unknown factors, that their estimation cannot permit of any deduction; (5) the other methods of examining the myocardium are so perfect that the differential stethoscope is superfluous. (1) It has been objected that a short, sharp sound can be heard through a smaller orifice than a louder, long drawn-out sound. This would beg the whole question of measurement of sound. What was really meant was that, for the same expenditure of energy, a sound of short duration is louder than one of longer duration of the same frequency of vibration. The latter statement is true, but has no bearing upon the matter under discussion. The instrument does not measure energy expended, but intensity of sound. (2) It is quite true that the loudness of the heart sounds depends upon what intervenes between the heart and the stethoscope. Therefore an absolute measure of the *energy* of a heart sound at the skin surface would be of but little value. With the differential stethoscope the *intensities* of sounds are compared. If the patient is fat, probably the fat will be symmetrical; if emphysematous, probably that, too, will be symmetrical, in which case the ratio will not be seriously affected. (3) The relation between the loudness of the heart sounds and the condition of the heart muscle is based upon experience. Results, perhaps, are the best reply to this criticism. (4) If we were to attach importance only to observations in which all factors were known, we should attach importance to none. We attach importance to the temperature, while knowing very few of the factors which govern this; and to the presence of albumin in the urine, to blood-pressure, to heart frequency, and to innumerable other observations of which the governing factors are beyond our knowledge. (5) The examination of the myocardium can be carried out by measuring the alteration in electric potential at different points during the heart beat. Probably the electric method is better than the differential stethoscope. Opportunity to compare has not offered, but Leyton hopes to investigate that matter soon. The instrument required is delicate, but not very portable. The patient would have to be brought to the instrument, and not the instrument to the patient. The sphygmograph may demonstrate a pulsus alternans, which is said to point toward myocardial degeneration. But he has seen cases of advanced myocardial degeneration in which there was no pulsus alternans within a comparatively short time before dissolution. A gradually falling blood-pressure in an aged person is very suggestive of myocardial degeneration, but this method requires several observations spread over months or even years. Perhaps many of these criticisms may have been offered by men who have never used the instrument even in its cruder form.

The differential stethoscope allows one to determine the relative intensities of a series of sounds; the next question which arises is the evidence upon which the conclusions rest. The first point is the remarkable constancy of the ratio of the first sound at the apex to the second sound at the base: this is 2.1 in the healthy man, the sounds being measured while the patient is standing. The instrument is of no value when there are murmurs which obscure the sounds. A medical friend was asked his opinion about the value of the differential stethoscope. He replied that he had not made up his mind yet, but that he had been prevented from making a serious error in prognosis by its aid. In the case of a man presenting no evidence of disease except that the second sound of the heart, according to the differential stethoscope, was louder than the first sound, death occurred quite suddenly six weeks after the examination. A similar experience occurred to Leyton, a number of years ago, in a man of little over fifty who complained of indefinite symptoms. The second sound of his heart was double that of the first sound. His daughter was told that the end might come at any moment. Three months later the man died suddenly while at his desk in his office. There are many opportunities for watching the gradual alteration in the heart muscle as age advances, and often, *pari passu*, a fall in blood-pressure due to increasing debility.

The gradual approach to unity of the ratio of the heart sounds, and then the aortic second becoming louder than the apical first, and later the edema of the legs and then of the lungs are only evidence of the accuracy of the instrument, not of its utility. The cases of influenza, scarlet fever, diphtheria, and other infections with the ratio of the heart sounds becoming unity, and as recovery occurs returning to 2.1, are so numerous that any record of the cases would be tedious. After more than ten years' use of the differential stethoscope his conclusion is that, when the ratio of the intensity of the first sound at the apex to the second sound at the base is less than 1.5 to 1, there is usually considerable alteration in the heart muscle, and rest is indicated. This alteration need not be of a permanent character; in young people it is frequently due to a temporary toxemia.

A Possible Electrocardiographic Sign of Myocardial Change is described by S. Russell Wells and J. Strickland Goodall.²⁰ Numerous attempts have been made to arrive at a just estimate of the condition of the myocardium in regularly acting hearts, such as the careful consideration of the subjective symptoms, the response of the heart to exercise, the relative intensity of the first apical and of the aortic second sounds, the length of the *A.-V.* or *P.-R.* interval, and the inversion of the second ventricular or T-wave of the electrocardiogram in at least two of the usually employed leads. No doubt all these methods have their uses. The authors have had, during the last few years, the opportunity of examining several thousand cardiac cases and of comparing the clinical findings, and in a large proportion the subsequent histories as well, with the electrocardiograms. They have become convinced that the height

²⁰ British Medical Journal, August 11, 1917.

of the second ventricular or T-wave affords some indication of the efficiency with which the ventricles are functioning.

The second ventricular wave marks the end of systole; and it is generally agreed that it is produced by some portion of the base remaining in a state of contraction after the contraction of the apex has ceased. There is not, however, the same agreement as to the exact site of this residual contraction. Sherrington considers it to be the aortic base; other observers are not disposed to localize it so definitely. The essential question is whether very low or absent T-waves in an electrocardiogram indicate myocardial impairment or not. As pronounced myocardial degeneration does not easily yield to treatment, suitable opportunities are not common. Syphilitic myocarditis might afford the required material, and 2 such cases are now put on record. One patient, first seen in June, 1915, had been severely infected in 1901. He complained of pain in the left side (only being able to sleep when lying on the right

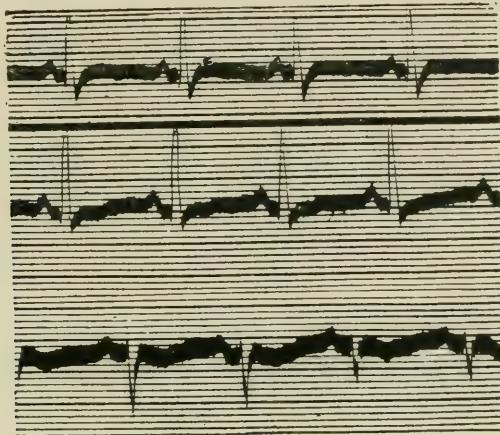


FIG. 4

side), pain over the sternum, slight dyspnea, and a sickly sensation over his heart on exertion aggravated after meals; there was no cough or edema. The cardiac dulness was slightly enlarged. The first sounds were weak, but no murmur was audible. The pulse-rate, 100; blood-pressure, 140. He did 10,107 foot-pounds of work in two minutes, with poor reaction, and signs of collapse. The electrocardiogram showed an absence of second ventricular or T-waves in leads 1 and 2, with inversion in lead 3. He was treated with mercurial inunctions and steadily improved. When examined again in 1916, his pains had disappeared; the cardiac dulness was still slightly increased, but the apex beat was well within the nipple line; the first sound at the apex was flapping and short; the second, reduplicated; the aortic and pulmonary second sounds were audible; the blood-pressure was 118. His electrocardiogram shows well-marked second ventricular waves in leads 1 and 2 with inversion in lead 3.

The second patient, first seen in July, 1916, had contracted scarlet fever when 13, and syphilis in 1908 for which he was treated for two years. He complained of dyspnea and palpitation on exertion and a constant feeling of lassitude, and said that he fainted on excitement, or any overexertion. He was markedly anemic, the pulse-rate was 60; volume very small; the apex beat was diffuse and almost impalpable; the area of cardiac dulness was greatly enlarged, extending from 2 inches to the right of the midsternal line to over 5 inches to the left. X-ray examination revealed a very large heart, the shadow agreeing with the limit as defined by percussion; it was obviously soft and atonic, and seemed to be lying horizontally on the diaphragm. The first sound at the apex was very faint and flapping in character, the second sounds were audible at base and apex. No murmurs could be heard. He was not exercised, nor was his blood-pressure taken, as he fainted twice

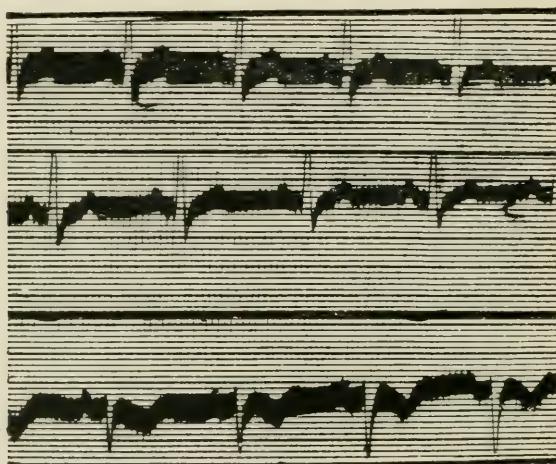


FIG. 5

during examination. His electrocardiogram showed very poorly-marked second ventricular waves in lead 1, almost absent in lead 2 and completely so in lead 3. He was treated with mercurial inunctions and improved. The cardiac area was reduced in size. The electrocardiogram now shows well-marked T-waves in leads 1 and 2, and distinct T-waves in lead 3.

While it is not contended that these 2 cases are conclusive proof that absence of the second ventricular waves in the electrocardiogram indicate myocardial change, they are certainly suggestive, and tend to confirm many other curves in their series. It is to be hoped that other observers will put on record their experiences in syphilitic and other forms of myocardial involvement, that something like certitude may be reached.

METABOLISM.

A Chemical Sign of Life. In his book, published by the University of Chicago Press, Shiro Tashiro gives an account of a series of experiments

to prove that in all forms of life, vegetable or animal, some tissue interchange of oxygen and carbonic acid is essential to the maintenance of vitality. For the detection of carbon dioxide proceeding from living tissues under varying conditions, he devised an extremely delicate test whereby the presence of one ten-millionth of a gram could be demonstrated with certainty. The test consists in the formation of a precipitate of barium carbonate, easily visible through a hand lens, when carbonic dioxide is brought into contact with a film of half-saturated barium hydroxide solution. The ingenious apparatus described and figured, is named a "biometer." Waller and others had long since demonstrated the occurrence of electrical changes in the course of all vital processes. It has now been proved that chemical changes also are no less constantly occurring in all living matter. Special attention was paid to the chemical changes taking place in living nerves, both medullated and non-medullated. It is clearly shown that the chemical change in a stimulated nerve is greater than in a nerve at rest; and that such changes cease or are greatly diminished when the nerve is anesthetized. "Irritability is the universal sign of life, and by it living matter adjusts itself to its environments;" but whether such irritability is the cause or the consequence of the chemical changes remains to be proved. The evidence that has thus been accumulated by means of the "biometer" has brought us, the author believes, "as near as we have yet got to life itself."

The Metabolic Activities of the Lymphatic System. Of all others, the "lymphatic" glands seem to be best entitled to the name of "blood glands," and of "endocrine." Their contribution to the purification of the blood is fundamental; unlimited in its extent; metabolic and regulatory in its object; universal and continuous in its operation. This view is suggested to us by J. T. Shirlaw's²¹ remarkable paper on "Nitrogen and Cancer." The liberation of nitrogen brings about an increased instability of the protoplasm of the adjacent cells, and therefore their more rapid proliferation. Shirlaw believes it is this process which underlies the healthy repair of tissues. Ross and Cropper have identified, as "auxetics," substances which have the power of inducing division. The principal auxetics are extracts of organs which occur naturally in the process of katabolism, and are therefore nitrogenous. If we grant that the *role of nitrogen* in metabolism is so important, we naturally turn to those glands which are concerned with the excretion of the nitrogenous compounds, and keep the nitrogenous balance steady. Such are the spleen and liver. The spleen can be excised and the patient yet live; but we know little as to the changes in the body subsequent to excision. Except when there has been an accessory spleen, restoration to permanent health has yet to be proved. Two cases of splenectomy were brought by Ballance and Pitts before the Clinical Society. In a boy, aged ten years, it was noticed at the operation that a spleniculus was left behind. He recovered rapidly, and was in robust health five months later; but the superficial gland had enlarged. A woman, aged forty-five years, who was removed from

²¹ Practitioner, March, 1918.

the theater in a desperate condition, was apparently convalescent in ten days. She then began to decline, and, by the eighteenth day, her condition was again critical, with weakness, emaciation, thirst, drowsiness, etc. The daily administration of extract of sheep's spleen and of raw bone marrow, brought about gradual convalescence, and ultimately complete recovery. Some groups of enlarged lymphatic glands could also be felt in this case.

The other glandular structures possibly concerned in the excretion of nitrogen are the lymphatic glands. The resemblance between the structure of the spleen and the lymphatic glands is very close; the chief difference being that in the latter the stream which flows through the organ is lymph, in the former it is blood. He therefore believes that the lymphatic glands assist in the breaking up and elimination of the nitrogenous products derived from protoplasmic changes. They were not evolved only for the purpose of anticipating bacterial invasion from without. It is more reasonable to assume that they are constantly at work in the vital economy. Their inflammation in blood poisoning demonstrates their depurative functions.

After middle life their functional activities begin to fail, and a gradual accumulation of nitrogen occurs in the blood and tissues. Senile decay first affects the glands. Aging is a critical time when nitrogen is in excess. Some may inherit a compensating power of adaptation. In others the organic adjustment is too precise: and somewhere, in local cells already stimulated by the accumulating nitrogen, a little extra supply will suffice under some irritation to start excessive growth and division. His nitrogenous theory is largely based upon the preference of cancer for tissues highly compounded of nitrogenous molecules. Deposits of fat, consisting of relatively simple molecules that are weak in nitrogen, and therefore exposed to little change, are passed by. This suggests to him that the treatment of cancer would be to supply the ferment normally acting on nitrogenous bodies, therefore to give extracts of the spleen and lymphatic glands. He infers that the serum of the connective tissues is absorbed by the blood capillaries, and its nitrogen dealt with by the spleen; while that which bathes the epithelial cells has its nitrogen attacked by the lymphatic glands. We might thus expect lymphatic gland extract to destroy the malignancy of carcinoma, and splenic extract, that of sarcoma; this is a matter for clinical experiment. But, seeing that the structure of the glands is so similar, why not give a mixture of both? It is not to be supposed that this treatment could remove a tumor already formed; all it can do is to destroy its malignancy. Shirlaw concludes by narrating a case diagnosed as carcinoma of the duodenum in an old lady of seventy, who was treated solely with 5-grain capsules of splenic extract supplied by the British Organotherapy Company, with a successful result. He cannot absolutely prove that it was carcinoma; but the tumor was easily palpable, and he was confident about the diagnosis. She was at one time so ill, with vomiting, pain, and pressure symptoms, that he told her family to prepare for her death. She steadily improved under the splenic extract, put on flesh, and was able to walk a distance of five miles.

The Influence of Muscular Exercise on Longevity is a theme which no living man is better qualified to discuss from medical and from personal experience than Sir Hermann Weber,²² still hale and hearty in his ninety-fifth year. The stronger pumping of the heart improves the circulation of blood and lymph in the abdominal organs, with the help of the stronger contractions of the diaphragm and abdominal walls, thus leading to improved oxygenation and to increased metabolism, appetite, digestion, and assimilation; therefore daily walks should be taken, if possible in the open country, and in all weathers. The amount of walking required depends on the individual constitution, the state of health, and on the habits and occupation; also on the meteorological conditions—heat or cold, dryness or humidity, strong or light wind, or stagnation of air. The walk ought not to be extended to actual fatigue, but ought to lead to exhilaration and agreeable warming of the whole body. The pace, too, must vary in different persons, from less than a mile to three and four miles an hour.

The following is his enumeration of some of the benefits accruing from walking exercise steadily kept up: (1) Increased afflux of blood to the muscles. (2) Increased nutrition, combined with improved metabolism and production of body heat. (3) Increased exchange of fluid between blood and tissues. (4) Facilitation of the removal of waste products. (5) Preservation of the elasticity of the thorax and lungs. (6) Abundant supply of oxygen for the blood and the metabolism. (7) Maintenance of a healthy condition of the organs of circulation, from the heart to the smallest arteries, capillaries, and lymphatics. (8) Massage of the bones, keeping up the healthy condition of the bone substance and the functions of the bone marrow, and through this the formation of a sufficiency of blood efficient for the fight with hostile bacteria entering the blood. (9) Increased resisting power of the body against disease. (10) Stimulation of the brain centers which initiate the action of the different sets of muscles.

“Although I know that it is not alone to the exercise of the muscular system that I owe the health and strength which I retain in my ninety-fifth year, but that the attention to hygiene in general, to the digestive functions, to the mental work, and the tenor of the mind, as I have explained in my little book on *Prolongation of Life*, has had a great share in it, yet I am sure that the keeping up of the muscular system has played a prominent part, and does so still. Spending daily two or three hours in the open air, walking, as a rule, 30 and more, frequently 40 or 50 miles a week, and enjoying the beauties of nature, have had an exhilarating effect on the mind, and kept up the whole organism and its resisting power. The possibility of heredity might be suggested, but that both my parents died in their sixtieth year—my father from cerebral apoplexy (a frequent cause of death among his forefathers) and my mother from inherited weakness of the heart, leading to frequent bronchial attacks, and to anasarca and effusion into the pleural cavities. More probably there was a predisposition to those life-shortening

²² British Medical Journal, February 23, 1918.

affections. If so, I have been able to counteract it by a steady struggle from an early period of life."

The Determination of Acidosis. The latest of Palmer and Van Slyke's serial studies on acidosis at the Rockefeller Institute hospital (IX, "On the Relationship between Alkali Retention and Alkali Reserve in Normal and Pathological Individuals"), addresses itself to the need for some simple practical measure of it. This has been sought provisionally in "titrating the body" as to the amount of NaHCO_3 required to render the urine alkaline, *viz.*, normally from 5 to 10 gm. In health this occurred when the plasma bicarbonate (as CO_2) reached 71 ± 5 per cent. by volume. In disease, more is generally required, according probably to impairments in renal efficiency. As an "alkalosis" has recently been described, for instance in tetany, clinicians have good ground for desiring some safer guide than the tentative, and possibly harmful, indications arising from a progressive bicarbonate medication—and, we might add, some safer corrective for acidosis than the crude administration of mere alkaline chemicals. Meanwhile that desirable control of the therapeutic use of sodium bicarbonate can only be secured by determining the plasma bicarbonate. They do not think that more severe acidosis often occurs than is indicated by the bicarbonate retention test in "titrating the body," but rather contend that it may be indefinitely less severe. The alkali retention test, conducted by feeding bicarbonate until the urine shows an alkalinity approximating that of normal blood, indicates either the approximately correct alkali reserve, or less. If no acidosis is indicated by the test, its absence can be accepted; but if acidosis is indicated, its degree can only be determined by blood analysis.

Acidosis a Possible Cause of Certain Symptoms in Diphtheria. B. A. Peters²³ refers to the severe and later cases not treated with antitoxin before the third or fourth day. In many of these the rapid improvement from the serum treatment is followed on the tenth to twelfth day by a dusky pallor, refusal of food, and persistent vomiting leading in three days to fatal asthenia. In his large fever hospital experience of nine years he has never seen such a case recover except under the treatment he describes. All drugs proved useless to check the vomiting. Adrenalin, pituitrin, and salines by rectum or subcutaneously, and the stoppage of all food by mouth slightly prolongs life, but did not stop the vomiting. From analogy with the symptoms described as acidosis due to delayed chloroform poisoning, a trial was given of 30 to 35 gm. of sodium bicarbonate a day in 2 per cent. solution, by rectum and subcutaneously. This patient stopped vomiting within twenty-four hours, and recovered after a prolonged convalescence. In 7 subsequent cases the daily total urine was tested for total acidity, for total N and total ammonia, and for the quantity of acetone and oxybutyric acid, with confirmatory results. During the past eleven months, every severe case, coming under treatment late, has been treated at once with 10 to 15 gm. of sodium bicarbonate a day for several days in divided doses by the mouth, in

²³ British Medical Journal, January 5, 1918.

addition, of course, to full doses of antitoxin. Not one of the whole 290 cases had any vomiting, and many unexpected complete recoveries have taken place. The mixture given every four hours is sodium bicarbonate, 2 gm.; potassium bicarbonate, 0.3 gm.; magnesium carbonate, 0.5 gm.; water to make 30 c.c. This appears to alter the toxic pallor to a more healthy tint, it increases the urinary secretion and diminishes the albuminuria. Peter's conclusions are as follows: (1) Some of the symptoms in vomiting cases of diphtheria may be due to a previous acidosis causing *adrenal exhaustion*. (2) These symptoms are not prevented by antitoxin if the patient does not receive it by the third or fourth day of disease. (3) The administration of large amounts of alkali diminishes or stops vomiting, but does not usually save the patient. The administration of 10 to 15 gm. of alkali daily for several days from the earliest possible moment, with full doses of antitoxin, appears to prevent the onset of these symptoms.

Vegetable Foods for the Diabetic. Special attention is called to Ruth A. Wardell's advocacy, and to her important investigation in the Sheffield Scientific School of Yale University, because the value of vegetable food is not limited to diabetes, but is also paramount in the treatment of many affections, including the severe anemias, asthma, renal disease, and some forms of dyspepsia. The underlying principle is its curative property, of which diabetes, in the reporter's opinion, stands in greater need than any other disease. That curative property is distinct from the mere food value as measured in calories. It resides in the soluble accessory substances which activate nutrition, and in the soluble salts which raise the mineralization and the strength of the economy. The main objective is to ensure their undiminished supply; the main risk is their systematic habitual loss in the routine process of food preparation. Any vegetable food that can be safely taken in the fresh uncooked state is therefore a great therapeutical asset. The next best to this is to guard against any draining of its juice in the process of cooking, by either baking or steaming the fruit or vegetable in the unpeeled state. This is dealt with in Courtney and Bartlett's²⁴ article on "Some Analyses of Vegetables Showing the Effect of the Method of Cooking," and in Chick and Hume's²⁵ valuable paper on "The Distribution among Foodstuffs of the Substance Required for the Prevention of Beriberi and Scurvy." Diabetics are deprived of both boons for fear of the soluble carbohydrate content. Yet their cure lies wholly in an invigoration of their metabolism up to relative toleration, which an abundant vitalizing vegetable diet alone can secure. Wardall's labors seem to us to have missed the main purpose, while providing most valuable special information. "Thrice cooking" or prolonged "extraction at 100° or 60° C." may reduce the carbohydrate to a tolerable proportion, but inevitably minimize the curative value. The most efficient alternative would be a progressive reeducation, beginning with a selection from the group with minimal carbohydrate content (3 to 5 per cent.), to a vegetable diet suitably cooked, but best of all, when possible, uncooked.

²⁴ American Journal of Children's Diseases, 1917.

²⁵ Journal of Royal Army Medical Corps, 1917.

A Vegetable Milk. A. L. Daniels and R. Loughlin²⁶ report the result of their experimental investigations at Madison, and extol the peanut as a staple article of diet, comparable to the soy bean which likewise only needs the addition of suitable inorganic material and the fat-soluble food accessory to render it a complete food. McCollum and Simmonds,²⁷ too, report that, in rats, various mixtures of seeds, with only distilled water for drink, fail to induce any growth; while the addition of salts of sodium, chlorine, and calcium make the seed food complete from the inorganic side; some iodine also was added to the water once a week. Thanks to that addition, no xerophthalmia resulted. Millet seed and flax seed are distinctly better sources for the fat-soluble product than wheat, oats, or maize.

	Water.	Nitrogen constituents.	Fats.	Starch.	Cellulose.	Ash.
Lentils—						
Maximum . .	13.50	24.64	1.45	62.45	3.75	3.45
Minimum . .	11.00	19.36	0.50	56.07	2.88	1.75
Haricot beans—						
Maximum . .	20.40	26.46	2.46	63.23	6.00	5.65
Minimum . .	8.50	13.80	0.40	52.04	1.95	2.20
Peas—						
Maximum . .	14.20	26.63	1.65	61.10	3.52	3.70
Minimum . .	9.80	18.88	0.85	56.18	2.38	2.00
Broad beans—						
Maximum . .	15.30	26.51	1.50	58.03	7.86	3.23
Minimum . .	10.60	20.87	0.80	50.89	5.24	2.06
Soy beans—						
Maximum . .	11.30	38.41	14.80	32.11	6.20	5.20
Minimum . .	10.00	34.85	12.95	26.74	3.60	4.35

Meanwhile an artificial "vegetable milk" was being elaborated from the soy bean, the first notice of which appeared in the *British Medical Journal*, April 13, 1918. Five ounces of the bean are soaked overnight in a quart of cold water; it is then coarsely ground, mixed with the water in which it has been soaking, and filtered through muslin. The result is a milky fluid with a rather strong smell of haricot bean, which disappears after it has been raised to the boiling-point. Infants take it readily. Mixed with tea or coffee, the taste is imperceptible. Fresh soy-bean milk has a faintly acid reaction. It is quite homogeneous under the microscope. Its physical properties are those of cows' milk. Rennet causes it to curdle, lactic acid germs set up in it a lactic acid fermentation, and when boiled it "rises" like ordinary milk and forms a pellicle on the surface. Its composition is: Casein 3.13 per cent., fats 9.89; but it lacks carbohydrates, a shortening which can easily be remedied. Butter cannot be made from soy-bean milk, but cheese can be made (120 grams of the bean yield 184 grams of cheese). Soy-bean milk can be retailed at 3 centimes a liter. The residue, after making milk, is still rich in alimentary principles, and can be worked up into palatable "almond" cakes or biscuits, practically free from starch and specially suited for diabetics. Roasted, the bean provides a colorable imitation of coffee, just as do

²⁶ Journal of Biological Chemistry, March 30, 1918.

²⁷ Ibid.

barley and oats, to what a satisfactory degree only those who make use of these substitutes will understand. The soy bean is very rich in phosphates, so that infants reared on the milk are never likely to develop rickets. It contains four times as much mineral constituents as meat, and is twice as rich in phosphoric acid. The analytical table speaks for itself.

There are varieties according to climate, variously suited for oil or milk or cattle food.

GAS THERAPY.

Artificial Respiration in Asphyxia Neonatorum. Mouth-to-mouth insufflation (or through a catheter) has proved more efficient than any of the manipulative methods, but its serious objections led Clarence L. Heald²⁸ some years ago to devise a simple apparatus which he has found more satisfactory. A small inflatable balloon is connected with a hand-ball, and a suitable mask, with a valve providing for a maximum ex-

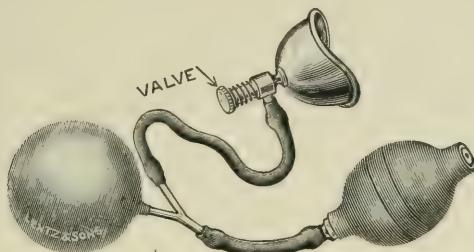


FIG. 6

pansile tension of 8 mm. Hg. After the mouth has been cleared out and a tracheal catheter passed, if necessary, the tongue is brought forward, but not outside the mouth, by a needle and thread; a towel is wrapped around the abdomen, not too tightly, to check any gastric inflation. An assistant keeps the balloon inflated, while the operator holds the mask, with its long diameter transversely, over the child's mouth, including the chin, but not the nose. With the index finger of the same hand he manipulates the piston of the air valve, pressure on which allows the air to flow. With the finger and thumb of the other hand he alternately compresses and releases the nostrils through which expiration takes place. Pressing the air-valve piston, at the same time compressing the nostrils to prevent escape of air, he inflates the lungs. Simultaneous release of the air-valve piston (stopping the air flow) and release of the nostrils allow expiration to take place through the nostrils. The moment the nostrils are released and the air valve is closed, the natural resiliency of the lungs and thoracic walls causes a partial collapse and the escape of a considerable portion of the air. This inflation is kept up rhythmically, as rapidly as is consistent with rather full expansion and deflation, and as long as necessary to induce normal respiration. As this small and inexpensive instrument gets the air into the child's lungs quickly, and

²⁸ Journal of American Medical Association, April 13, 1918.

with a rhythm and rapid change approaching normal respiration, it should be available when needed.

The Therapeutic Value of Oral Rhythmic Insufflation of Oxygen. S. J. Meltzer's²⁹ paper is based upon observations in cases of pneumonia in the cyanotic stage. He assumes that the period of definite cyanosis is preceded by a more or less long period during which the capacity of the vital cells for taking up oxygen, and storing it is gradually getting impaired; and he believes that during the early periods the insufflation of oxygen might be capable of restoring that capacity to the normal, and of preventing the stage of cyanosis.

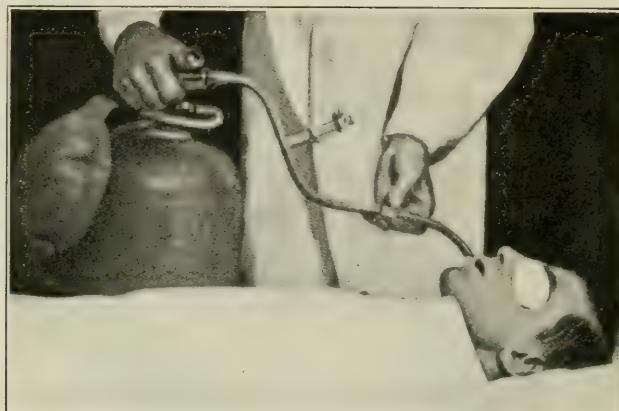


FIG. 7.—The oral insufflation apparatus. The rubber tubing which is connected with an oxygen tank terminates at its distal end in a strong rubber bag which in turn is connected with the "respiratory valve." The ring of this device occupies in this illustration an expiratory position; hence the distension of the bag. Above the ring an aperture can be seen, which appears only when the valve is closed (expiratory position). The respiratory valve is connected at its distal end by means of a short piece of rubber tubing with the hollow "tongue depressor." The T-tube is here unessential.

He therefore recommends that, in pulmonary and cardiac disease, oxygen should be administered by insufflation several times a day at an early period when there is not yet an urgent necessity for it. Oxygen should not be considered as a terminal measure. On the other hand, it ought to be emphasized that oxygen is not a specific. But it may make the body more amenable to the curative action of other therapeutic agents, and give them a better chance of efficiency.

A tongue depressor should be inserted in the mouth not much farther than the middle of the tongue; so that, if the patient is conscious, there is no gagging or other discomforts. The lips should be kept closed. The ring should be moved from left to right and from right to left (a respiratory circle), about twelve times per minute. The oxygen should be turned on slowly, and the velocity of its escape controlled, so that it does not cause an overdistension of the bag during the expiratory pause.

²⁹ Journal of American Medical Association, October 6, 1917.

The turning of the ring to the right should be done slowly, so that the inspiration may develop gradually; the turning to the left is preferably done abruptly. The expiratory air escapes during the closure of the valve, through the nose and through the aperture that appears above the closed valve when the ring occupies an expiratory position. It is advisable to time the inspiratory insufflation synchronously with the inspirations of the patient. After a while the respiratory phases of the patient become involuntarily adapted to the phases of the insufflation.

Ozone in Cases of Gassing. George Stoker³⁰ strongly advocates this treatment, from his recent experience of its excellent results in these cases, as well as in the cases of pneumonia, bronchitis, etc., which he has treated during the last twenty years. When generated by the silica tubes, ozone is *absolutely non-irritating*, and seldom fails to bring relief or cure. It is a powerful agent in the formation of oxyhemoglobin. In many sinus cases it arterializes the blood in the wounds. It is a complete germicide and renders sputum and wound discharges microscopically aseptic. It is a strong heart stimulant. The apparatus for generating ozone is simple, portable, and light. It can be worked with a motor air-pump wherever there is an electric-light current; or with an air reservoir where there is no electric supply. It is economical and convenient, and does away with the use of pure oxygen and cylinders, only atmospheric air being used from which the ozone is generated.

Intraspinal Injection of Air for the Treatment of Tubercular Meningitis. Chronic hydrocephalus was first treated some years ago by the writer by the induction of complete artificial pneumocephalus (with promising results); the entire intracranial fluid being replaced by air by means of a double cannula introduced into the ventricle. Ramond and François³¹ now relate their recent application of the same principle in acute tubercular meningitis, on a partial scale and by the indirect spinal route, corroborating the harmlessness of the penetration of sterilized and warmed air into the ventricles. Their procedure is to withdraw about 40 c.c. of fluid through lumbar puncture. Air is then drawn into a Roux syringe (through a long, red-hot platinum needle to sterilize and warm the air) and is then slowly injected through the needle which has been left in place. The amount of air injected should not exceed half or two-thirds of the volume of fluid withdrawn. The injection can be repeated for five or six consecutive days but no longer, as the nitrogen in the air is not readily absorbed. If oxygen is used instead of air, it can be kept up indefinitely. The results were encouraging; but the patients all died after a period of improvement. In the case of a soldier of 25 in coma, the improvement for two weeks was so striking that complete recovery seemed inevitable. The tenth day after suspension of the air injection the patient became unconscious and died in three days. They believe it possible that, if the injections of air were made at once, as soon as the diagnosis is established, they might prevent the extension of the tubercular process, especially if the air were injected into the lateral ventricles.

³⁰ Lancet, April 13, 1918.

³¹ Bulletin Soc. Méd. Hôp., October 26, 1917.

In future Ramond will inject more air; the amounts hitherto used, from 2 to 15 c.c., were probably too small.

The authors take this opportunity of reaffirming that tuberculosis is essentially curable, especially when it involves serous membranes. Their experience during the last two years with injection of air seem to suggest that this treatment has a future. It has been found useful in tuberculous peritonitis and pleurisy, by various workers; and Ramond has found it effectual also in arthritis, orchitis, and meningitis.

The Therapeutic Value of Local Treatment by Gases is also illustrated by the reported success of the SO₂ treatment recently practised in France for gonorrhœa and described in the *Journal of American Medical Association*, 1918, vol. i, pp. 738 and 1027. Four c.c. of a tepid solution of picroic acid (6 gm. in 1000 c.c.) are mixed with 1 c.c. of an anhydrous sodium thiosulphate (hyposulphite) solution (17 gm. in 1000 c.c.), and injected 3 times a day into the urethra, to be retained for fifteen minutes at least, as the evolution takes twenty minutes at the body temperature (37° C.). In contrast with the aerial mucous membrane no irritation or pain are set up. In the chronic stage one daily injection is given, using 5 or 6 c.c. of the mixture.

General Analgesia by Oral Administration of Ether. James T. Gwathmey and Howard T. Karsner's³² report is in the nature of a preliminary communication based on animal experiments and a sufficient number of clinical cases to support the conclusions. The total amount of ether that may be given with safety by this method has not yet been determined. It is considered advisable for the present to supplement the method either by local anesthesia or the administration of small amounts of anesthetic by inhalation. In rabbits, the best results were obtained by the use of ether in oil. This mixture, however, produced an acute gastritis; but further investigation showed that olive oil alone produced quite as severe a gastritis as when combined with ether. Since olive oil is practically non-irritant to the human stomach, it was considered safe to proceed with the investigation on man. It was thought, however, that liquid petrolatum might be even less irritant in man, and, accordingly, the menstruum was changed to liquid petrolatum for clinical work. The following combinations were tried:

FORMULA I.

Ether	4	fluidrams
Liquid petrolatum	4	fluidrams
Peppermint water	5	minims

FORMULA II.

Paraldehyde	1 to 3	fluidrams
Ether		
Liquid petrolatum, equal parts, enough to make	1	fluidounce
Peppermint water	5	minims

FORMULA III.

Ether	3½	fluidrams
Liquid petrolatum	4	fluidrams
Peppermint water	5	minims

³² Journal of American Medical Association, April 6, 1918.

The mixtures containing paraldehyde were disagreeable to the taste and smell, the ether-oil very much less so; but the difficulty was soon overcome by taking a mouthful of port wine before and after swallowing the dose. Numerous patients were given it with excellent results. Only one was nauseated, who was violently opposed to taking the wine. In another man who had repeated attacks of vomiting, the vomiting ceased permanently. All were able to take food and water shortly afterward. As the paraldehyde served no useful purpose, most of the dressings have been done with Formula I. The oil and ether mix perfectly and do not separate into layers. Baskerville has shown that the rate of evaporation from minute to minute is constant with different percentages of ether in the oil, assuming a constant temperature and exposed surface. It is impossible, therefore, for the patient to get an overdose at one time, or too little at another time. The total amount is not absorbed at one time; if it were, the administration of 2 ounces of 50 per cent. ether in oil would produce complete anesthesia, as there would be liberated 1 ounce of ether. Naturally, the surface for evaporation is greater in the stomach than is the case in the colonic method, and the absorption of ether is more rapid. But the patient is as safe by this method as if the ether were in a container outside the body. All anesthetics are analgesics; before the danger zone is reached the patient must become anesthetized. Hence the patient in the analgesic stage is separated from the danger zone by the period of anesthesia. Analgesia by this method is therefore safer than any method of anesthesia. If the anesthetist carries his patient to the "blear-eyed" snoring stage, he defeats the object for which this special method was devised, the object being to take advantage of the analgesic stage producible by any of the anesthetics used. If adopted, it would release from the routine of administration of anesthetics a certain number of anesthetists now devoting their entire time to that work. In conclusion: (1) General analgesia is safer than general anesthesia. (2) Fifty per cent. ether in liquid petrolatum or other bland oil is probably the safest general analgesic, has apparently no deleterious effect on the stomach, and is not followed by the nausea and vomiting that frequently accompany inhalation anesthesia. It may be given without unpleasant taste when "sandwiched" between mouthfuls of port wine. (3) The method is especially indicated during the dressing of painful wounds without taking the patient from his bed or ward; and, when supplemented, can be employed for surgical operations.

TRANSFUSION.

At the Fourth Inter-Allied Surgical Conference held at the Val-de-Grâce, March 11 to 16, transfusion was one of the subjects discussed; and the following conclusions were formulated: Transfusion is the method of choice in the treatment of serious hemorrhages. (*a*) *Early.* The clinical condition of the wounded affords the main indications for transfusion, and the advanced posts must alone be depended upon. But additional information may be obtained from repeated observations of the blood-

pressure, and by red blood cell counts which are of value in wounds of the limbs. In circulatory collapse due to a very acute infection (gas gangrene) no favorable result has been observed after transfusion. The indications for transfusion in the treatment of shock have not yet been sufficiently defined. (b) *Later.* Corpuscular anemia after hemorrhage is generally well borne, and does not justify transfusion if the general condition of the wounded man is satisfactory. On the other hand, secondary hemorrhage, diminution in the coagulability of the blood, failure of regeneration of the corpuscles, and chronic infections causing anemia, may afford indications for transfusion.

Preliminary Precautions. (a) *Risk of Transmission of Diseases.* Donors should be examined and classified in order to avoid transmission of diseases, such as syphilis or malaria. (b) *Incompatibility of Corpuscles.* Fatal results have been observed in cases in which the corpuscles of the donor were agglutinated by the plasma of the recipient. Such results are rare, and can be completely avoided by agglutination tests which can easily be extemporized. This being so, it is indispensable to examine the agglutination whenever it is possible, or to have the donors classified beforehand. At advanced posts it is justifiable to resort to transfusion, even if it be impossible to test the agglutination, as the risk of serious results is relatively small; but it should be tested in all other units. (c) *Asepsis.* Transfusion should never be undertaken unless an application in perfect condition is available and unless strict asepsis is possible.

The Method of transfusion employed should make it possible to measure the quantity of blood transfused. The use of blood which has been preserved for several days has given satisfactory results, and has proved specially valuable in advanced posts during intense military activity. Indirect methods for the transfusion of fresh blood are more easy to employ than vascular anastomosis. The three indirect methods have all given good results, namely, the use of citrated blood, the aspiration of pure blood into an ampoule treated with paraffin, and its aspiration in a syringe. The general principle should be to practise transfusion as early as possible after the receipt of the wound; but it must not be employed until hemorrhage has stopped. In hemorrhage from thoracic or abdominal wounds, or wounds of the limbs, transfusion should be practised either before or during the operation, the time of transfusion depending on the condition of the wounded man.

Transfusion of Whole Blood. A leaderette in the *British Medical Journal*, December 8, 1917, referring to a letter in the same issue from Sir Edward Schäfer, reminds us that he was the first to demonstrate experimentally on dogs and cats, nearly forty years ago, the value of the transfusion of blood in cases of severe hemorrhage. He attached the vessel of the donor to that of the recipient by cannulae connected by a piece of rubber tubing six inches long. The cannulae and tube were filled beforehand with sodium carbonate solution. But that suggestion, made in 1879, was long ignored. In 1909 Crile published his *quasi* ideal method of direct transfusion. A single metal cannula is used to connect the two vessels; the severed vein of the recipient is pulled through the lumen of the cannula and then turned back like a coat sleeve over

its end. The artery of the donor is then pulled over the open end of the vein which has been turned back over the cannula, and the vessels secured in this position by a ligature. When the clamps previously placed on the vessels are released, the blood must flow from donor to recipient over uninjured continuous endothelium, and does not come in contact with a foreign surface of any kind. There are, however, well-known objections to the employment of direct, as compared with indirect, transfusion. The indirect method has many advantages, and most of those who have had extensive experience have abandoned all direct methods.



FIG. 8.—The position of the arms. The donor's left hand grasps the patient's left arm well above the elbow, bringing the donor's radial artery almost into apposition with the patient's median basilic vein.

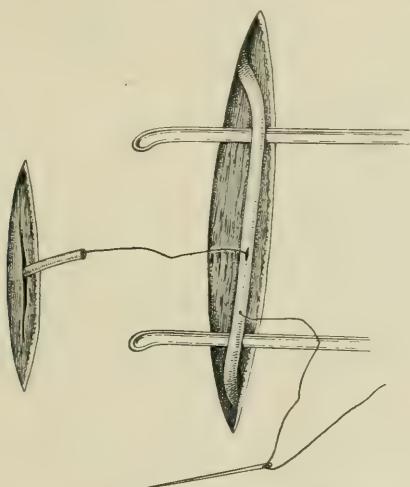


FIG. 9.—The preparation of the vessels. The radial artery has been cleaned for about an inch, divided, and drawn out of the wound. A traction suture has been tied onto the artery. The patient's vein has been exposed and lifted by two probes. By means of its needle the traction suture has been passed through the incision in the vein and out of the vein wall about an inch higher up the vessel.

A Simple Method for the Direct Transfusion of Blood. The method described by A. J. Hull³³ is explained by the illustrations. A 2-inch incision is made over the patient's median basilic vein. A similar incision is made over the radial artery of the donor. The artery is cleaned for

³³ British Medical Journal, November 24, 1917.

about an inch, the lower end of the artery in the wound is clipped, digital pressure is made over the brachial artery, and the radial is cut above the clip. The end of the radial artery is pulled out of the wound, and a traction suture is tied through the wall of the artery. For the preparation of the vein two probes about an inch apart are passed under the vein for hemostatic purposes. A small cut is made into the vein (2 mm. in length); through this the needle bearing the traction ligature from the radial artery is passed. The needle emerges from the vein an inch above the incision. A second suture is now passed through the wound in the vein; this suture is used to close the vein when the artery has been inserted. By drawing upon the traction suture the artery is drawn into the vein, the vein suture is tied, and the probes and digital pressure removed. The blood is allowed to flow until the donor feels faint. The artery is then clipped, pulled out, and ligated. The whole procedure is carried out under local analgesia. It may be objected that making use of the radial artery as a cannula involves a serious and avoidable mutilation of the donor. This is not the case; ligature of the radial artery must be performed in any case, and the excision of an inch or so of the vessel makes no difference. The elasticity of the artery renders its use as a cannula easy, and a considerable length of vessel becomes available through a comparatively small wound. The chief disadvantage is that the amount of blood transfused cannot be measured; but this is outweighed by the safety and simplicity of the method, and, moreover, the amount of blood which flows before the donor becomes faint is fairly constant.

Some Possible Therapeutical Developments of Transfusion are suggested by O. Leyton³⁴ on the strength of the total absence of injury to the donors by the multiple syringe method. A register of willing donors, classified under their blood groups, is being prepared at the London Hospital, to save delay in urgencies. In cases of failure from injections of vaccine it might be possible to obtain a donor of the same blood group as the patient, and give him injections of the patient's autogenous vaccine. When an immunity had been developed, a series of transfusions might be given. On that plan we might perhaps some day reduce still further the mortality due to diphtheria and tetanus by having donors immunized against these bacilli, and using their blood for transfusions in cases of very weak children, where previous injections of horse serum would lead to anaphylaxis, or serum sickness to fatal results.

Further Observations on the Hemagglutinin Reaction, with Special Reference to the Operation of Blood Transfusion and to Nephritis are contributed by Colonel C. J. Bond.³⁵ They show that: (1) The different human serums vary much in their hemagglutinin content when tested with the same standard red cells. This grading of hemagglutinative capacity is independent of the specific power of different serums to agglutinate the red cells of different individuals according as they fall in one or other of the established groups. Individual serums belonging to the same agglutinative group differ in their capacity for agglu-

³⁴ British Medical Journal, February 23, 1918.

³⁵ Ibid., March 2, 1918.

tinating the same washed red cells. This means that incompatibility of donorship in blood transfusion is also of a graded character. It is therefore desirable, when testing incompatibility, to express not only the presence, but the degree, of agglutinative reaction. (2) But not only does the specific hemagglutinative capacity vary in degree in different serums, it also varies from time to time in the serum of the same patient. This fact is even more important than the first. He mentioned, in an earlier communication, that a non-agglutinative serum may become agglutinative in a patient who has passed successfully through a systemic infection. A study of 140 patients, whose serums were tested against his own red cells before and after recovery from wound infection, supplied records of 13 cases in which a subsequent test detected some change in the hemagglutinin content of the blood serum. In all cases the change was either from a negative to a positive reaction, or from a low to a high degree of hemagglutinin content. This generally coincided with a healthier condition of the wounds and with improvement in the general health of the patients.

He also tested the hemagglutinative capacity of the blood serum against his own red cells and those of sheep in 50 cases of *nephritis*. Of these, a second examination was made, after an interval, in 25 cases, and a change in hemagglutinative capacity was observed in 15. In 7 cases a negative was converted into a positive reaction, and in 8 from a lower to a higher hemagglutinin content as far as his own corpuscles were concerned. Patients suffering from albuminuria consequent on nephritis show, on the whole, a lower hemagglutinin content of blood serum than is found in a corresponding group of partly healthy persons. Thus we are led to the conclusion that a leakage not only of serum albumin and globulin but also a hemagglutinin does take place from the kidneys in nephritis. This is important, because, if the blood serum is drained of hemagglutinin, it may also be drained of other substances of the antibody group; and this loss may be associated with the lessened resistance to infection which is known to exist in these patients. To conclude: In a considerable number of cases, under conditions which require further analysis, but which seem to be associated with recovery from albuminuria in the nephritis cases, and with successful resistance to general infection in the wound cases, a definite alteration occurs in the blood serum, for the most part in the direction of an increased hemagglutinin content. The bearing of this fact on the problem of blood transfusion now becomes apparent. If the blood serum of a recipient may be at one time compatible with the red cells of a given donor, and at another time may agglutinate those cells, the donor's serum may also, as the result of recovery from infection or other illness, change in the same way. Cases have been recorded by Robertson, by Lee, and by others, in which transfusion of blood from the same donor to the same recipient had no harmful effects on one occasion, but was followed by death on a second. He ventures to suggest that changes in the hemagglutinin, and probably in the hemolysin, content of the blood serum of the recipient or donor, or both, occurred in the interval between the two transfusions, and were responsible for the unfortunate result.

A Method of Citrated Blood Transfusion, with which, at a casualty clearing station under rush conditions, a series of 44 satisfactory transfusions were given without reactions of any consequence, is described with every technical detail, by Oswald H. Robertson³⁶ of the U. S. Army. The apparatus is simple in use, and easily made out of material at hand.

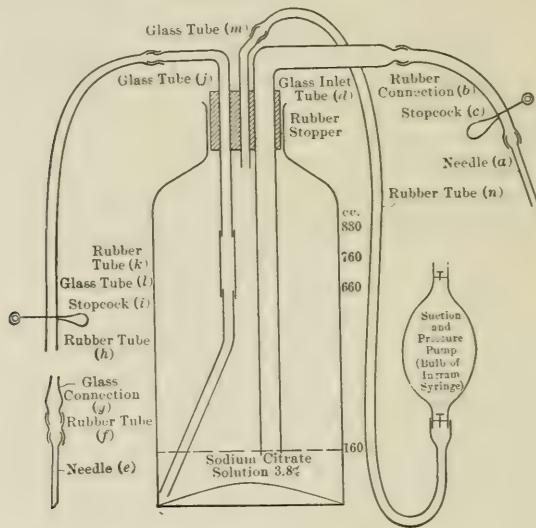


FIG. 10

An isotonic solution of sodium citrate is used instead of the usual 10 per cent. solution, for the sake of maintaining more nearly normal conditions. The amount of sodium citrate contained in the 160 c.c. of "isocitrate" is approximately 6 grams. No harmful effects have ever been observed from the injection of this quantity of citrate, which is very much less than the reputed toxic dose; 0.5 per cent. citrate has been shown to be sufficient to prevent clotting when well mixed with blood. When 500 c.c. of blood are drawn into 160 c.c. of a 3.8 per cent. solution the resulting mixture is 0.9 per cent. citrate. With 700 c.c. of blood it is 0.7 per cent. An amount of blood as large as 800 c.c. may be safely taken into this amount of citrate if the blood flow is well maintained, and the blood and citrate are thoroughly mixed. The sodium citrate in this mixture equals 0.6 per cent. In bleeding quantities over 700 c.c., the flow through the needle is apt to slow up, and mixing the blood and citrate becomes more difficult.

Aside from its being a "one man job," this method is simple and rapid. The bleeding can be done in a conveniently arranged room outside the resuscitation ward. The blood is then carried into the ward and given without any risk from moving the recipient. The chief considerations in the technic are to get the blood quickly and cleanly into the citrate, to obtain prompt and thorough mixing of the blood with the citrate, and to transfuse the blood as soon as possible after the bleeding. Coating

the inside of the bottle and tubes with paraffin is quite impracticable in rush periods. Furthermore, judging by the excellent results obtained without the use of paraffin, it seems questionable whether a paraffin coating is necessary.

E. Hédon³⁷ states that Agote, of Buenos Aires, was the first to resort to simple citration; though Hustin had employed, the preceding year, a solution of sugar and citrate. Hédon's experiments in animals bled to extreme anemia have shown that citrated blood kept on ice for ninety-six hours does not lose its resuscitating power. In the same number E. Jeanbrau gives his successful clinical results in a variety of surgical and medical conditions, confirming the fact that the usual dose of citrate injected does not exert any hemolytic action, or lead to secondary hemorrhages. Mammalian milk may be regarded as a physiologically citrated fluid. He considers that citrated venous blood transfusion is as effectual as the direct vein-artery method, and much to be preferred to the latter.

Transfusion of Plasma is another suggestion, proposed by Gordon R. Ward,³⁸ who contends that much difficulty might be avoided by not transfusing the corpuscles at all, but only citrated plasma, which would be easy to keep and easy to give. The corpuscles are not wanted. The ideal fluid for keeping blood-pressure at its proper level, and for supplying the permanent value of "food," is plasma. A trial of this method, controlled, say, by an equal number of whole blood, and of gum acacia (not less than 6 per cent.) transfusions, would settle that question.

Intravenous Injections of Gum Acacia in Low Blood-pressure. The following instructive statements are made by W. M. Bayliss:³⁹ "I have pointed out that a 6 or 7 per cent. solution of gum has a viscosity and a colloidal osmotic pressure equal to those of blood. Accordingly, if the best effect in replacing blood lost by hemorrhage is to be obtained, solutions of this strength should be used. Even a solution of only 2 per cent. has properties greatly superior to those of any solution containing salts alone. At the time of my visit to the casualty clearing stations this solution was being used tentatively, but the stronger solutions have now come into more general use. In a large series of experiments on cats, I have found that solutions of 5 per cent., or above, can always be depended upon to restore permanently the low arterial pressure due to loss of blood. If the loss has not been great, 4 per cent. is frequently successful, and sometimes even 2.5 per cent. The height to which the pressure is raised by a given quantity of solution depends on its strength; as also does the length of time during which it can be relied upon to maintain the pressure. In a report about to be presented to the Shock Investigation Committee, the solution recommended is one containing 6 per cent. of gum; and as salt is necessary to make the solution isotonic with the blood corpuscles, also 2 per cent. of sodium bicarbonate. The latter is added in place of the usual sodium chloride, in order to combat the diminution of alkaline reserve usually met with in shock, a condition exaggerated by operation."

³⁷ Presse médicale, February 4, 1918.

³⁸ Ibid., March 9.

³⁹ British Medical Journal, December 15, 1917.

From an exhaustive experimental investigation at the Rockefeller Institute into the "Fluid Substitutes for Transfusion after Hemorrhage," Peyton Rous and G. W. Wilson have recently confirmed Bayliss's contention that permanent betterment cannot be expected in cases of severe hemorrhage with solutions containing less than from 5 to 7 per cent. of gum acacia. They add that it is not essential that a blood substitute should possess the viscosity of whole blood.

THE HEART AND PERICARDIUM.

Pericardial Knock. This strange designation was given by S. Maynard Smith,⁴⁰ to an undescribed cardiac physical sign of mysterious origin. His first observation suggested to him that it was due to a shell fragment lodged where the pleura and pericardium are in contact. That this explanation was not the correct one was proved by his second case. The peculiar sound could be heard when standing beside the patient's bed. The entry wound was on the left of the precordium; and the track passed in the direction of the pericardium. Two days later a right-sided subphrenic abscess developed and was drained. The foreign body was found lying in the right side of the abscess cavity. An infected hemothorax was also drained. The patient died a few hours later, and, at the autopsy, a "shaggy" purulent pericarditis was present. This case showed clearly that the foreign body was not itself directly responsible for the sound. In the next case the foreign body was visible on the screen in the cardiac area. It moved continuously with the heart beat, so that a skiagram showed only a blurred image. At the autopsy the pericardial surface was normal. The cavity contained a few drops of blood-tinged serum due to the passage of the missile, which had traversed the pericardium and lodged in the interventricular septum. This case, as also several others in which the "knock" disappeared after twenty-four or forty-eight hours, in patients who never had serious symptoms, shows that pericarditis is not the cause.

Possibly the sound might be due to emphysema of the connective tissue of the mediastinum. Or, again, the usual disappearance of the sound after a short period, and the absence of serious symptoms in many cases, suggest that it may be due to air in the interstitial connective tissue of the lung pulsated by the beats of the heart. Further records will doubtless throw more light on the subject. The sound is more like a click. It varies from a faint sound just discernible by careful auscultation, to a noise resembling that in the ear-piece of a telephone when the lever is moved up and down. It may be heard sometimes when standing at the foot of the patient's bed. Sometimes the patient is conscious of it, and on one occasion himself called attention to it. In nearly every case the sound disappears after forty-eight hours; although in one patient who was recovering from a chest wound without any complications the sound persisted for ten days. It is, as a rule, loudest near the apex beat. It is usually double, corresponding to the heart sounds,

and its intensity waxes and wanes with respiration, sometimes disappearing completely in full expiration. A distinct fremitus can be felt by the hand laid on the chest.

Traumatic Pericarditis. A remarkable instance of a simple non-infective pericarditis due to mechanical irritation by a foreign body, and ending in recovery after its removal, is reported by A. G. Hall and J. B. Ferguson Wilson.⁴¹ A girl, aged twelve years, picked up a rusty sewing needle and put it in the front of her dress. Later on the same day she vomited twice, felt sick and had some pain in her chest. The mark of a needle prick was found in her chest and half of the needle was found still in her dress. Five days later she had slight fever, rapid and shallow respiration, but no pain. Examination showed a much enlarged area of cardiac dulness, precordial friction rub, and other signs of pericarditis with effusion. Radiograms showed a portion of a needle projecting through the chest wall immediately over the heart, just to the left of the sternum, and at the level of the fourth costal cartilage. The needle was successfully removed by operation, without opening the pericardium. There were no signs of pus or other evidences of infection. The pericarditis rapidly subsided after the removal of the needle. The absence of any severe symptoms suggests that pericarditis *per se* might not account for the usual symptoms recorded in text-books as characteristic of this disease; but that the severity is rather due to the primary condition which gives rise to the pericarditis. Pericarditis has sometimes been found postmortem in cases in which no symptoms had been noted suggestive of its existence.

Pneumopericardium following Paracentesis. C. E. Stewart's⁴² patient, a man, aged thirty-nine years, was admitted to the hospital with a large pericardial effusion which was diagnosed to be due to tubercle. Three years previously he had been operated for acute appendicitis, and three months later had had a prolonged febrile attack with severe pain in the right upper abdominal quadrant. The same pain (possibly due to pericarditis) had returned in September, 1915, and had continued ever since. Twenty-two ounces were withdrawn at the first paracentesis, and 14½ ounces a month later. The case is of lasting interest in connection with the skiagrams taken before the first operation, and after either of them.

At the first paracentesis air was accidentally admitted, as seen in Fig. 11. The *x*-ray strikingly demonstrates the unchanged shape and position of the heart, the horizontal level of the remaining fluid (which the heart kept in constant agitation), and the diagnostic contrast between the curved outline of the right auricle, and the sharp angular outline of the distended pericardial cavity, to which attention was called many years ago in these pages.

Cardiac Anatomy and Physiology. THE FUNCTIONAL ANATOMY OF THE HEART. Arthur Keith,⁴³ in his Harveyian Lecture, reminds us that Wm. Harvey (1578-1657), the greatest of functional anatomists, was the foremost lecturer on "Anatomy" in London from 1615 to 1656

⁴¹ Lancet, December 8, 1917.

⁴² Journal of American Medical Association, April 27, 1918.

⁴³ British Medical Journal, March 30, 1918.

and yet he was stolen from it, as a patron saint by the mid-Victorian physiologists.

Taking Harvey's method as a guide, he shows how far our modern functional conception of the heart falls short of a full and satisfactory explanation of its structural features. Beginning at the apex: Why are the ventricles of the mammalian and avian heart shaped like a cone? Why is it that the wall of the apex is so thin that even in a cart-horse it is only 2 mm. in thickness, while the rest of the ventricular wall ranges from 10 mm. to 25 mm. in thickness? Why do the spiral fibers of the ventricles form the well-known apical vortex? Why do the main



FIG. 11.—Condition after paracentesis, at which time air entered the pericardial sac.

arborescences of the A-V bundle terminate in the apical region so that, as Lewis has demonstrated, the contraction wave is first manifested there? Why is the arrangement of the musculature, both of auricles and of ventricles so complex? The heart is a pump of a peculiar kind. In all man-made pumps only one part of the wall is movable (the piston) and the moving power lies outside the pump. In the cardiac pump the whole wall is movable, and the power resides in its every part. The expelling energy is manufactured there. The human heart is made up of a central or principal pump—the left ventricle, to which are attached three subsidiary pumps; the right ventricle, and the right and left auricles, loading pumps for the ventricles, not mere reservoirs.

How is the cardiac pump fixed? Each chamber of the heart must have its fulcrum at some point. The auricular pumps are fixed to the dorsal wall of the pericardium; and through extensions of that sac, and by means of the pulmonary vessels and the lungs they are fixed to the walls of the thoracic cavity—both costal and diaphragmatic. When we open the thorax we at once undo the fixation of the auricles, as Berry Haycraft was the first to recognize. There are really two points of fixation—*two fulcra*—from which the musculature of the ventricular pumps act. In the first place the ascending aortic stem is fixed within the cupolar part of the pericardium and the extensions of that membrane to the neck and to the roots of the lungs. In the second place there is the apex of the heart itself. By a most marvellous mechanism nature has converted the apical region of the heart into a movable fulcrum from which its ventricular musculature can and does act; while in lower vertebrates, such as the tortoise, apical fixation is supplied by a ligament which anchors the blunt curvature of the ventricular chamber to the pericardial sac. Passing from the fixation of that complex cardiac pump to the manner in which the ventricular chambers are fixed, we learn from comparative anatomy and embryology that the primitive tubular heart undergoes an extraordinary transformation, not unlike that which takes place in the stomach. In the stomach one border undergoes rapid and extensive development to form the greater curvature, while the other is retarded in growth and becomes the lesser curvature, which in some animals is so short, that the esophageal and pyloric orifices are almost in contact. In the ventricular part of the cardiac tube the lesser curvature undergoes so great an arrest in development that the auricular or proximal orifice comes to be situated side by side with the aortic or distal orifice, *with only the anterior cusp of the mitral valve between them*. The greater curvature grows out as evaginations to form the ventricular chambers, leaving an untouched part between them to form a septum. The beginning and end of the ventricular tube thus come to rest side by side on the lesser curvature, and form what we call the “base” of the ventricles. The anterior cusp of the mitral is a landmark on the ventricular base; it separates the auricular commencement from the aortic termination of the ventricular tube.

The distinction between auricular and aortic bases is of the utmost practical importance. When the ventricles contract it is the auricular base, surrounding the mitral and tricuspid valves, which becomes greatly reduced in size. The aortic base is, from a functional point of view, scarcely altered. The aortic base becomes a fulcrum from which the expelling musculature acts; while the auricular base descends toward the apex, drawn by a musculature which acts from the apical fulcrum. The descent of the auricular base necessarily enlarges the auricles. The movements of the auricular part of the ventricular base provide a key to the venous pulse. They also give us a clue to the complex architecture of the ventricular musculature.

We owe to John Hunter a great principle which he steadfastly applied to the elucidation of muscular action; no muscle acts alone. Every muscle acts in coöperation with an antagonist. His supreme example

was the circular muscular coat of an artery. In the bowel the circular fibers have longitudinal fibers as their antagonists: The effect of the contraction of the circular muscular coat is to diminish the caliber of the tube, and at the same time to increase its length. Hunter saw that arteries are elongated by the contraction of their muscular coat, and regain their normal length by the recoil of their elastic coat. Their muscular and their elastic coats are antagonistic. In the muscular coats of the left ventricle we have to deal with a coördinated antagonism between a very massive circular "expelling" coat set between an outer and inner spiral coat. We have also to recognize the two fulera or fixed points of the left ventricle—the aortic fulerum and the apical fulcrum. The "fixed axis" of the left ventricle passes from the mouth of the aorta to the apex; all the muscular fibers of the left ventricular are so set that in contraction they approach that axis. Besides the principles of antagonism and of fulera, there is a third principle involved in the architecture of the ventricular musculature. The principle of the iris diaphragm is utilized. All the muscular coats or fasciculi of the heart are so set that they ultimately end in the internal spiral coat of the left ventricle, just as every segment of an iris diaphragm takes a share in forming the margin of its pupil.

In this reasoned physiological anatomy we are at once impressed by the functional importance of the region of the apex. The chief terminal arborescence of the A-V bundle end in the trabecular network of the apical region. Thomas Lewis has demonstrated that the apical region is the first to pass into contraction with the onset of ventricular systole. When we open the ventricles we see that their internal musculature—*columnae carneae* and *musculi papillares*—commence in the apical region and divide into two sets. The larger set terminates in the auricular or movable base, the smaller or septal set in the fixed or aortic base. When we examine the outside of the ventricles we find the same arrangement in the spiral fibers. They commence in the vortex of the apex and divide into two sets—an extensive one which ends in the auricular movable base, and one less extensive, which ends in the fixed aortic base. Between these outer and inner sets the spirals of the great middle driving muscle of the left ventricle are so closely pressed together that they give the appearance of being purely circular; we may speak of them as the circular set. The circular musculature, acting by itself, would diminish the circumference and at the same time lengthen the lumen of the ventricle; but the elongation is antagonized by the internal and external apicobasal musculature. We know that, at least in the earlier phase of ventricular systole, the auricular base approaches the apex and therefore the circular fibers are more than antagonized. In the later stages of ventricular systole the opposite is the case; the circular fibers become dominant and press again on the auricle, raising the intraauricular pressure. The apico-aortic fibers are purely sustaining in function; they neither shorten or lengthen in systole.

The right ventricle is peculiar in several respects both in its structure and mechanism. There is incorporated in its infundibulum a chamber—the "pylorus" of the primitive cardiac tube—an element which has

completely disappeared in the left ventricle. The pulmonary orifice does not serve as a fixed point for the ventricular musculature; the infundibular septal bands of the right ventricle act from the aortic base as a fulcrum. Further, the right ventricle has only one wall—the lateral. Its septal wall—the interventricular septum—is part of the left ventricle; and it takes only a passive share in expelling blood from the right ventricle. On the other hand, the right ventricle is provided with a highly developed internal musculature passing from its apex to the auricular base. As the systolic movement of that base is more marked on the right side than on the left side of the heart, we find in the lateral wall of the right auricle a well-developed opponent set of muscles—the musculi pectinati. In auricular systole the musculi pectinati elongate the apicobasal fibers of the right ventricle; in ventricular systole the opposite occurs. Keith noted, when investigating those hearts in which Sir James Mackenzie first observed that the auricles had ceased to functionate (from auricular fibrillation, as was afterward proved), that a condition was present similar to that which occurs in a limb when a set of muscles undergoes contracture from paralysis of the opponent group. In such cases the lateral wall of the right auricle had become elongated and stretched, while in their opponents—the apicobasal fibers of the right ventricle—an extreme degree of shortening had occurred. As a closing comment on this novel survey he states that he has merely touched on some of the many unsolved problems relating to the structure and mechanism of the heart, quite content if he has succeeded in showing that Harvey's physiological method of investigating anatomical problems is still the best that anatomists can adopt.

UP-TO-DATE ANATOMICAL TEACHING. Prof. Elliott Smith's latest views on the rational teaching of anatomy are set forth in the *British Medical Journal*, April 13, 1918. "Anatomy should be regarded as an integral and intimately coördinated part of the whole medical course. The teaching should be directed toward the needs of the practice of medicine; and should keep in touch with the progress of medicine as a whole."

The late Professor Franklin Mall, in banning all lecturing on anatomy, contributed most to the high level attained in America. "The lecturer should deal with the aspects of anatomy which the student is unable adequately to learn in his dissections, such as the lymphatic system, the clinically important, but much neglected, sympathetic system, and the anatomy of the viscera." The constant use of a living model is absolutely essential as a means of studying the anatomy of the living body. "The primary value of dissection is to enable the student to find his way about the body. I have learned to find my way from Princes Street to the University, but cannot name a single street or landmark. Yet I have the essential knowledge which meets my needs. The vital knowledge of anatomy essential for the student is of a similar nature."

All written examinations in anatomy—at least, all questions in descriptive anatomy—lead to the accumulation and perpetuation of barren knowledge. If students were subjected to practical examinations

on the living, as well as on the dissected body, we should soon hear the last of the complaints often urged by physicians and surgeons—that the anatomy taught to students is useless for clinical work.

SEPARATE RESPONSE OF THE MUSCULAR TONE OF THE HEART CHAMBERS, AND THEIR INDIVIDUAL PHYSIOLOGICAL AND PATHOLOGICAL ESTIMATIONS. C. Minerbi's⁴⁴ important investigations were conducted on the basis of Abrams' percussion reflex by systematic percussions along definite lines. A series of twenty strokes of the hammer and pleximeter is followed by retraction of the auricle, atrium, or ventricle according to the line of strokes. Their outline is then found to be 1, 2 or more centimeters inside the previous outline. The normal retraction thus obtained often amounted to a total of 4 cm. for the entire heart in the course of three minutes. That retraction he regards as due to the direct autonomic excitability of the muscle tissue, independently of the diastole proper. From this he concludes that the auricle and the atrium can contract independently of each other, as well as of the ventricle. Another instructive test is a modification of the Azoulay-Varisco test. The subject reclines horizontally, without a pillow, and the extended legs are slowly raised by an assistant to an angle of 75 to 80 degrees, the subject remaining entirely passive. The pulse pressure and limits of the heart are then recorded anew. The assistant then releases the legs, and the subject lowers them very slowly to the bed, taking five to eight seconds for this; considerable muscular effort is required to keep from dropping the legs. A complete record is then taken again. In his 600 applications of these various tests on 30 persons, including both pathological and normal subjects, he found that with the Azoulay-Varisco test the sound heart reacted exclusively with a pronounced retraction of the auricles. With a weak heart muscle, the auricles became enlarged at once, instead of contracting; and in extreme weakness the ventricles also became enlarged. The behavior of the heart under reflex action from the skin is also described in detail; and the mechanisms of the various muscular reactions of the heart are discussed. His main conclusion is that the heart possesses a delicate and effectual auto-regulating myotonic mechanism.

Cardiac Diagnosis. AMYL NITRITE INHALATION FOR THE DIAGNOSIS OF MITRAL STENOSIS. R. A. Morison,⁴⁵ M. R. C., U. S. Army, contributes this valuable suggestion, from the Military Heart Hospital, Colchester. In mitral stenosis symptoms of an incapacitating nature are frequently absent until the lesion is well advanced. In young soldiers, when very early and uncomplicated, it is unaccompanied by subjective symptoms to identify it. Advanced stenosis has been largely kept out or sorted out of the army. "Irritable heart" cases, without structural change, frequently present accentuation of the first, or accentuation or reduplication of the second heart sound—signs which are credited with significance in the early diagnosis of mitral stenosis. In dealing with military patients a clear decision is imperative; and, in sorting cases, tolerance of exercise is largely relied upon. But men with

⁴⁴ Rivista Crit. di Clin. Med., 1917, Ncs. 18 and 19.

⁴⁵ British Medical Journal, April 20, 1918.

structural disease are to be guarded above all against overexertion. A diastolic (presystolic) rumble or thrill, or both, is the most convincing sign of mitral stenosis; and it is at present inadvisable to diagnose this lesion in their absence. Any method, therefore, which accentuates such a murmur, or discovers it, must be of considerable value.

Among patients who fall near the diagnostic border-line are those who present no suggestion of it when standing, but unequivocal signs while lying down; in others there are inconclusive signs while standing, but signs of stenosis on lying; and in others no conclusive signs standing or lying, but a positive diagnosis while they lie after exercise. At Colchester, all cases are thus tested; but, in doubtful cases, amyl nitrite is used as a further test. Its action, like that of exercise, is to increase the flow of blood through the A-V ring, favoring the production of the murmurs in question. These observations are not based upon *postmortem* evidence, but upon the assumption that a clear presystolic murmur signifies stenosis in the absence of aortic disease. In 12 uncertain cases amyl nitrite (inhaled from a 3-minim capsule until a reaction was evident) brought forth unmistakable murmurs in 6 instances.

Among the first signs of early mitral stenosis is an accentuated first sound. From this the sounds pass to a simple reduplication with accentuation, or perhaps to a triplication; and thence to what may, or may not, be termed a murmur, according to the idiosyncrasies of the examiner. The point to be emphasized is that amyl nitrite, in a large proportion of cases, will raise the scale of the signs, bringing them nearer to a point where diagnosis becomes certain. As to the cases in which amyl nitrite has the reverse effect, and produces a lowering of the scale, in some cases abolishing a diastolic murmur, he speaks with more diffidence. Yet it is extremely suggestive that this reversal of the usual effect has been witnessed for the most part in cases in which aortic regurgitation was undoubtedly present, and where consequently the murmur may have owed its origin to a different cause (Flint murmur). Whether it will prove ultimately that the test serves to differentiate the Flint murmur remains for the future to decide. So far as military diagnosis is concerned, this is a matter of lesser importance. The point for which publicity is desired is the usefulness of the drug in bringing out clear presystolic murmurs in cases in which mitral stenosis is suspected but not proved.

INFARCTION OF THE HEART is hitherto practically undiagnosable. In 2 cases reported by S. A. Levine and C. L. Tranter⁴⁶ it simulated some acute abdominal condition. One of them was laparotomized; the other escaped that ordeal, thanks to a drowsiness suggestive of diabetic coma. The postmortem appearances were strikingly similar: the anterior coronary arteries were practically obliterated by thrombosis, with extensive infarction of the heart; generalized arteriosclerosis; lungs, liver, spleen and kidneys showing acute passive congestion and the liver edge extended to a hand's breadth below the costal margin. No other lesions were found which could account for the symptoms. The remarkable similarity in their history and clinical features, and in the physical

⁴⁶ American Journal of Medical Sciences, 1918, No. 1.

signs, lends special value to their publication as a nucleus of evidence from which might ultimately be evolved some attempt to fill the complete blank in the symptomatology of the affection. Both patients sought admission for acute epigastric pain (of a few days in 1 case, of a few hours in the other). Both had slight nausea, and some vomiting, but neither chill nor fever. Their past histories were essentially negative, except for antecedent angina in one. Physical examination showed marked tenderness in the epigastrium and a palpable mass in the region of the gall-bladder. The pulses were of poor quality, slightly accelerated; the heart sounds were feeble. No cardiac murmurs were heard. The apex beat was neither seen nor felt; the cardiac dulness, only slightly increased in one. One patient developed complete heart-block shortly before death. The blood-pressure in both patients was low; the pulse pressure in the first patient was only 12, and in the second 26. The anomalous signs, confined in both instances to the right lower chest, were a moderate number of rales; and subsequently a diminution of the breath sounds occurred throughout both lungs. The acute epigastric pain and tenderness, together with a leukocytosis of about 20,000, and a moderate fever in both cases made the diagnosis of an acute inflammatory or perforative lesion of the upper abdomen seem most probable. The conditions specially suspected as calling for laparotomy were perforated gastric ulcer, acute pancreatitis, or acute gall-bladder disease.

CARDIAC DISEASE SIMULATED BY THE RESULTS OF GLANDULAR ENLARGEMENT. A practical suggestion is contained in E. B. Gunson's⁴⁷ paper on "Cervical Glandular Enlargement in Children as Evidence of Infection." In his adolescent patients examined for symptoms suggesting cardiac disease, but found healthy apart from the fauces, their chief complaint was lassitude, exhaustion and breathlessness on slight exertion. In most of them no history of infection was obtained. The chief abnormal signs in many of them were those of slight or moderate enlargement of the upper deep cervical glands, associated with tonsillar enlargement in many cases; in others with faucial injection only. Not infrequently they were poorly developed, with deficient expansion of the upper chest, but no demonstrable signs of pulmonary disease. But a special investigation into the state of the cervical glands during the course of scarlet fever revealed several points of interest. Out of 100 consecutive cases observed throughout their stay in the hospital, 97 were mild, 3 were septic. All the mild cases recovered; 1 of the septic patients died on the thirty-fourth day. Upon admission, 91 cases presented enlargement of the tonsils and injection of the fauces. In 9 cases there was no enlargement of the tonsils, and in 3 cases the fauces were apparently normal. One patient, in whom tonsillectomy had been performed a few weeks before admission, had injected fauces; in this patient the tonsillar glands were enlarged. From the two sets of observations Gunson infers that while glandular enlargement is evidence of an infective process situated in the lymphoid tissue specifically drained by those glands, any simple chronic glandular enlargement in young children is

⁴⁷ British Journal of Children's Diseases, October-December, 1917.

associated with malnutrition, and alimentary and respiratory disorders. When the glandular enlargement persists into adolescence, or undergoes any increase, then the patient suffers from apathy, exhaustion, and dyspnea on slight exertion. These symptoms may be sufficiently severe to suggest cardiac disease. A careful examination will dispel that impression, and direct our attention to the glands and to the lymphatic system as the genuine source of the asthenic condition.

Cardiac Pathology and Treatment. THE HEART AND THE THROAT. At a time when cardiac *disablement* and cardiac *disability* occupy the forefront in the responsible question as to military efficiency, F. J. Poynton's "Observations on the Nature and Symptoms of Cardiac Infection in Childhood" should command careful perusal. His contention is that puerile infection (and rheumatic infection in particular) has a decisive influence over the future efficiency of the adult heart; and that much of its diseases is the result of the scars of healed infective processes. In childhood we can study the commencement of cardiac disease which often leaves life-long scars. There are many kinds of cardiac infection, but the rheumatic attacks all parts of the heart and produces every sort of cardiac disability. Mitral stenosis is an instance in point; in a children's hospital we see that it follows upon a sore throat, and we perceive the relation of angina faucium and rheumatic heart disease, and a promising line for preventive treatment. The terms rheumatic fever and acute rheumatism are misleading. One of the features of rheumatic heart disease is its frequently unobtrusive onset. This calls for a careful study of the *manifestations* of rheumatism.

A. The Throat and Nose Manifestations. "In 1900 Dr. Paine and I isolated from the tonsils of a patient suffering from acute rheumatism and tonsillitis, a streptodiplococcus identical in character with one we had already isolated from the blood, valves, pericardium, joints, and nodules of cases of rheumatism. This produced carditis, arthritis, and the various other experimental results we have fully described elsewhere. Some years later we continued these investigations in cases of recurrent rheumatism with diseased tonsils, and confirmed the accuracy of our observations. The conclusion from these results is obvious: *The infection may gain access to the body by way of the tonsils.* That inference had been suggested by clinicians for over a century. That a sore throat is frequently absent is certainly true. It would be unscientific to claim the tonsils as the site of entrance when nothing points in this direction; but it would be equally so to deny that structures of which we can only see the surface may not be diseased in their depths, or that a virulent infection may start from some other minute and painless local lesion." One lesson, however, can be safely learned. *An acute tonsillitis in a child should always call for careful examination of the heart.* There is no condition of the tonsils that can be claimed as specifically rheumatic. It is reasonable to believe that the micrococci are present in the healthy; and that they acquire their special virulence under circumstances of lowered resistance, particularly in those who inherit that constitutional tendency. It is very probable that in adenoid vegetations the micrococci may retain their virulence. Chronic nasal affections, too, or

internal otitis may be the source of infection. Enlargement of the cervical glands is common; enough attention has not been directed to its diagnostic importance.

B. The Arthritic Manifestations. Arthritis, with its associated muscular pains, is very frequent in rheumatic children, and on this account a valuable danger signal, although not usually severe. The rule has been long established that obscure pain in the joints and muscles in childhood should call for a careful examination of the heart.

C. The Choreaic Manifestations. In mitral stenosis a close association exists between chronic and repeated chorea and the evolution of the lesion, which illustrates the great influence that the rheumatic infection exerts upon the nervous tissues. The rheumatic child is the nervous child of the family. Rheumatic parentage predisposes to migrainous headaches, night terrors, emotional attacks, and general nervousness, and to a condition which in adults we might term neurasthenia. Similar evidence is sometimes given by rheumatic adults both male and female. They are highly nervous, and that when they have signs of active rheumatism they are almost unable to control themselves. Every case of chorea requires careful examination of the heart. The special effect of rheumatism upon the nervous system tends to produce functional disturbances of the heart, and even anginal symptoms, or, under given circumstances, symptoms akin to those met with so often in the soldier. This explains why, in some rheumatic cases the heart may have seemed to physical examination but little, if at all, damaged; while the neuro-muscular response to sudden physical strain or excitement may totally incapacitate them for any prolonged exertion.

D. The Cutaneous Manifestations. The various rashes and cutaneous manifestations of rheumatism give us a hint as to the nature of the rheumatic poisons of which we still lack accurate knowledge. The urticarial, erythematous, and purpuric lesions suggest an altered state of the blood producing undue fragility or permeability of the capillaries, so that a hot compress placed over an area of erythema may cause it to become purpuric. Akin are Filatow's or Osler's spots—on the pads of the fingers or toes, on the dorsum of the hand, or even in the palms and on the wrists. These may be the first definite signs in childhood of a progressive or malignant endocarditis; but likely to be overlooked, for they are minute and often little painful.

E. The Abdominal Manifestations. Reliable evidence upon these symptoms is scanty, for in rheumatism they rarely cause a fatal result. The exceptions are rare examples of acute gastric dilatation and appendicitis. But we repeatedly meet in rheumatic children with what are called "biliary attacks," apt to usher in a rheumatic exacerbation. Experiment has thrown a little light upon the subject. The diplococcus has been demonstrated in large numbers in the bile of infected animals. Recently, in an unpublished case of fatal chorea in a woman, Paine isolated the diplocoecus from the gall-bladder and cerebral tissues. Jaundice, too, is not very uncommon in rheumatic children, and it may complicate the course of a severe chorea. The bearing of these few observations is to draw attention to the occurrence of a triad of symptoms

in the rheumatic: *Instability of the nervous system, abdominal disturbances and faulty action of the heart.* And it is often difficult to decide which system is primarily at fault. Such cases are sometimes conveniently termed "neurasthenia."

F. General Wasting. Some indefinite illness occasionally disguises an insidious rheumatism. During a severe attack general wasting may proceed rapidly, sometimes dating the beginning of the last stage in severe heart disease, through failure of the circulation to maintain nutrition.

G. Anemia affords valuable evidence of the virulence of an attack. There are few more striking clinical signs than the ghastly greenish pallor of a deadly carditis. A neglect of the treatment of anemia in rheumatic adolescents favors the development of the malignant form of endocarditis which is most liable to make its appearance in early adult life.

H. Fever. In active carditis it suggests that there is progress in the lesions. Yet there are mysterious instances of fever which seem to leave no indication of its meaning. These greatly perplex us in our arrangements for convalescence. They remind us that in forming a judgment we must fall back upon the general condition of the patient and not be swayed overmuch by one symptom.

I. The Rheumatic Subcutaneous Nodules. The rare cases in which nodules are almost the predominant manifestations, and the heart little, if at all, affected, only serve to accentuate the value of the general rule. The occurrence of nodules seems to point to lowered power on the part of the cells to destroy the infective agent. The friction of exposed areas, and the movements of tendons, suffice to determine local lesions, which contain the infective agents at some stage in their life history. The same changes may occur in the subcutaneous tissues without producing an actual nodule.

The only clinical bearing of the rheumatic nodule is the light it throws upon the pathological changes in rheumatism, which are fundamental to the study of infective heart disease. First of all, the human frame resists the infection with great energy, the cells rapidly destroying great numbers of the micrococci. This can be observed most clearly in experiments; but it becomes equally apparent in the human tissues. The lesions in rheumatism are fundamentally local lesions, a general septicemia being unusual. The nodule gives us a picture of these local changes. The bloodvessels are dilated, the connective tissue becomes swollen, leukocytes invade the damaged area in the center of which are patches of necrosis. A fortunate section of an early nodule cutting through the margin of a necrotic area will show the micrococci. The lesions are so small and necrotic tissue is so sparse that healing often occurs without leaving any trace of the original swelling.

If we study the pericardium, the valves, or the joints, we find the same events happening and differing only in their anatomical surroundings, in the extent of the areas of infection, and in the function of the damaged tissues. Wherever there is necrosis there must be scar formation; and wherever there is great virulence there must be great hyperemia and

rupture of fragile vessels with consequent multiple minute hemorrhages. Where the tissues involved are secretory in function, the exudations differ with the virulence—they are sometimes hemorrhagic, sometimes clear, and sometimes serofibrinous. Much difficulty, mostly artificial, has arisen over the question of pus formation. The essential question is this: Are we to use pus as a specific term? For example, is the thick yellow fluid from a staphylococcal abscess to be called pus, and no other similar fluid to bear that name? If so, rheumatism is certainly non-purulent. No one, however, uses the term in that restricted sense; but, on the contrary, we speak of pneumococcal pus, of the thin pus of streptococcal infections, and so on. If we use the term as a description of a phase in an infective process, then there is a rheumatic pus; and it is found in advanced cases of rheumatic pericarditis. It is not in nature identical with the fluid of a staphylococcal abscess, for the chemical changes are doubtless different, but it is probably akin to the pus in some cases of pneumococcal pericarditis. Pending further pathological details to be given in later articles under the individual cardiac lesions, the essential points in this cardiac infection may be summarized as follows: (1) There is a great resistance by the tissues to the infection. (2) The general toxemia varies greatly in different cases. (3) The tendency is to multiple focal lesions. (4) Hyperemia, with increased permeability or fragility of the blood capillaries, is frequent. (5) There are swelling of connective tissue, cell proliferation, leukocytic infiltration, and necrosis. (6) Scar formation and adhesion follow necrosis. Exudations vary in character with the virulence and the nature of the surface involved.

THE NATURE OF THE RHEUMATIC POISONS. The remarks of Wm. Bramwell,⁴⁸ of Liverpool, under this heading (following up his paper in the *Lancet* on the "Variation in the Specific Gravity of Urine and its Relation to Disease") are of singular interest side by side with F. J. Poynton's second paper on the "Nature and Symptoms of Cardiac Infection in Childhood," based upon his well-known views as to the specificity of the rheumatic infection. Bramwell believes, as a result of twenty years' observation, that the rheumatism and chorea following scarlet fever and other infectious diseases are caused by the retention of katabolic toxins or tissue waste. The urine in these cases falls in specific gravity and continues in this condition long after the albuminuria, usually following scarlet fever, has disappeared; plainly showing that the glomeruli, as indicated by the appearance and the early disappearance of albumin, have been the first to suffer injury from toxins and high temperature and are the first to recover; but that the more lasting injury, as shown by the continued low specific gravity, has fallen upon the tubular epithelium and its functions of selective activity on the blood and of elimination for the toxins of katabolism. Much has been said of the absorption of tonsillar and dental toxins as a cause of rheumatism, chorea and cardiac troubles. Yet probably 25 per cent. of human beings are in apparent health with chronically disordered tonsils; while with regard to dental toxins, he can prove from examining recruits,

that scarcely one in 500 is without one or more carious teeth, and that many with undoubtedly septic mouths show no symptoms whatever of rheumatic, cardiac, or nervous disease. But rheumatism or its associates will supervene as soon as the tubular epithelium is sufficiently injured by toxins to lower its vitality, and hinder its action. The subsequent conditions follow from the retention of the products of tissue waste; conditions which neither the tonsillar nor the dental toxin acting alone is of sufficient virulence to bring about. The continued pale urine of low specific gravity constantly associated with rheumatism of this type points to an injured tubular epithelium and to the consequent retention of katabolic toxins as the cause of the rheumatism.

RHEUMATIC HEART DISEASE, ACUTE DILATATION, CARDITIS, AND PERICARDITIS IN CHILDREN. F. J. Poynton's⁴⁹ important study, of what he regards as the threshold of organic disease, is based upon 524 instances of an apparently first attack, presenting on admission: Heart disease in 293, chorea in 268, arthritis and arthritic pains in 267, sore throats in 147, nervous manifestations other than chorea in 80, anemia in 78, abdominal symptoms in 52, cutaneous manifestations in 39, general wasting in 39, nodules in 22, epistaxis in 8, and nephritis in 2. He distributes them into two groups: (1) Cases with sore throat, arthritis, and *morbus cordis*. (2) Cases with chorea and *morbus cordis*. In the choreic series (all chorea he regards as rheumatic), the sex percentage was: Females 69, and males 33. The age incidence in a previous series of 364 cases, published in his "Researches upon Rheumatism" was: One year and under, 4; one to two years, 3; two to three years, 13; three to four years, 25; four to five years, 38; five to six years, 40; six to seven years, 38; seven to eight years, 63; eight to nine years, 37; nine to ten years, 45; ten to eleven years, 37; and eleven to twelve years, 21.

Acute dilatation varies in severity; rarely fatal without endocardial or pericardial involvement; more frequently with some mitral endocarditis. As regards the mild acute cases, he points out the remarkable rapidity with which dilatation sometimes occurs even when a child has been in bed for some days, suggesting the sudden influx of a fresh wave of infection after the earlier one has been dealt with by the tissue cells. If there is mitral endocarditis of some severity the apical murmur is conducted toward the axilla, and even if not permanent will not disappear for many months, long after the soft murmur of dilatation will have vanished. If the endocarditis is slight the murmur may nevertheless persist after the dilatation has disappeared. If, however, the dilatation is more stubborn than usual there will be the signs of myocardial feebleness obscuring the endocarditis.

Carditis. The fatal first attacks are rare, more often met with in young children with a strong hereditary tendency to rheumatism. They never approach the character of a pyemia, as the necropsies prove. The 15 cases studied fall into two main groups: (a) Fulminating cases of acute carditis. (b) Insidious cases in fragile children of feeble constitution; deceptively quiet in onset, but none the less deadly. The four

⁴⁹ British Medical Journal, April 13, 1918.

examples given in detail showed no cyanosis and distended jugular veins, no pronounced development of edema, with great enlargement of the liver. The child is more often ashen pale and the general appearance one of a severe toxemia, with a high degree of oxygen want.

Pericarditis denotes a severe infection and is repeatedly met with in fatal carditis. At necropsies in 150 children under twelve years of age the pericardium was adherent wholly or in part in 113 cases, and in only 9 cases was it stated to be healthy. In only 6 cases were more than 3 ounces of fluid recorded in the pericardial sac. The pathological changes are much more complicated than our academical description of its three stages; inflammation, effusion and resolution. We know from experiment that rheumatic inflammation commences *within* the pericardial tissues (not upon the surfaces), with innumerable foci. In mild cases these are fewer and may not damage the endothelium. The exudations, too, vary in character with the virulence and stage of the process, hemorrhagic, fibrinoplastic or serofibrinous or agglutinative. The local foci may first implicate one part only of the pericardium, for example the posterior. In rare cases, again, a large effusion may give rise to special symptoms. We cannot assume a definite and regular sequence of events. There is sometimes extreme enlargement of the area of precordial dulness. By rule of the three stages we might regard this increased area as the result and the measure of the effusion, and the feebleness of the heart as its mechanical result. But in the vast majority of cases the increased area is the result of acute dilatation (added to, doubtless in some degree, by effusion). A trocar would probably pierce the heart. Let us therefore remember: (1) The varying types of pericarditis; (2) the rarity of large effusions; (3) the dependence of the symptoms upon a concomitant carditis. Clinically, the chief types in childhood are: (1) Acute internal pericarditis with some effusion. (2) Acute pericarditis internal and external, with mediastinitis and pleurisy. (3) Malignant pericarditis. (4) Relapsing cases.

Acute Pericarditis. There are not always in childhood great distress and illness. The physician is often surprised in a case of chorea to discover very obvious friction. In rheumatic pericarditis audible friction is the rule. The exceptions are either active myocarditis or localized posterior pericarditis. When effusion occurs the cardiac sounds become less audible and often the friction disappears or diminishes, although a loud pericardial rub may be heard even when there is a large effusion. Its reappearance, harsher and more grating, if coincident with a general improvement, shows clearly that resolution is in progress and the exudation becoming more viscid. Endocarditis is almost invariable, though we may not at first be able to detect it owing to the loudness of pericardial friction. Usually the active period is at least three weeks, during which close watch must be kept for increasing dilatation, progressive pallor and increased frequency of the pulse rate. When there is great dilatation or an unusual degree of exudation, pressure upon the left lung and its bronchus will produce a collapse of the lower lobe, simulating pneumonia or effusion, with intensely tubular breathing at the level of the lower angle of the scapula.

Acute Pericarditis, Internal and External, with Mediastinitis and Pleurisy. This group contains the cases in which the sequelæ due to adhesions are the most serious. The pain and distress are greater, owing to concomitant pleurisy, with friction heard along the right and left margins of dulness, while crepitations may be audible immediately under the stethoscope in the anterior mediastinum. Extension of the inflammation to the surface of the liver and spleen and peritoneal friction are comparatively rare signs. The duration is of many weeks. The heart is greatly dilated and remains so in spite of treatment. Later, hypertrophy may develop, and the signs of an adherent pericardium or of multiple serositis may slowly supervene.

Malignant Pericarditis is best exemplified by the following instance: A boy, aged seven years, had severe carditis in the preceding year, and three weeks before admission had suffered from multiple arthritis and precordial pain. His final illness lasted eight and a half months, during which there was irregular fever reaching to 104° F., and repeated crops of nodules. From time to time pericardial friction appeared and disappeared. He gradually became more anemic and weaker and died of cardiac asystole. The necropsy showed great thickening of the pericardium and some recent adhesions; no fluid was present in the sac. This type is termed "malignant" because it suggests a process in the pericardium closely akin to that in malignant endocarditis; great local change from the micrococcal infection, with nodular masses containing necrotic areas surrounded by greatly swollen and damaged connective tissue. There is also considerable persistent pyrexia. We do not, however, always find the widespread dissemination of foci that occurs in malignant endocarditis. The likeness lies in the obstinacy of the infection, the fever, and the severe general symptoms.

The Relapsing Form links the preceding and the more usual acute pericarditis. The symptoms may never be severe, but the process advances by a series of local areas of infection for many weeks. When the rub disappears there is some degree of general improvement; when it reappears there is an exacerbation of the symptoms. The pulse remains rapid and the heart is excited and dilated. Considerable thickening of the pericardium may result, and the heart itself is much damaged by chronic inflammation. It attacks fragile patients who have little power to destroy infection. The outlook is gloomy, although it may be difficult to realize the gradual sapping of the cardiac strength while the child is in bed carefully nursed and guarded. The cardiac sounds are muffled, and the greatly enlarged dulness precisely resembles the outline of a large exudation. Further, the interpretation of an *x*-ray examination needs caution. The outline of the shadow may suggest effusion, and yet the necropsy has proved the contrary to be the case. If we can clearly discern the outline of the heart within the outline of the pericardium this interpretation is justified; but in these cases no such distinction will be found. An attempt to drain the pericardium can only lead to failure or disaster. The danger is an incomplete healing of the foci and the development of the malignant form.

CLIMBING OR CRAWLING FOR THE RELIEF OF HEART DISEASE? We are told that both are good, yet their value can hardly be identical. Oertel's "terrainkur" again favorably recommended to our attention by A. Jaquet.⁵⁰ He believes that in hill climbing the leg work and the chest work both help to aspirate the blood into the great veins. It is clearly suitable only for the convalescent stage, and under the most watchful medical supervision. Crawling on all fours is a comparatively recent suggestion, introduced by Cecikas,⁵¹ and of much wider scope. The 8 cases he reports all presented distressing symptoms, including tachycardia. The relief obtained is plausibly attributed to the altered direction of the hydrostatic and of the visceral gravitations. The heart, our heaviest organ, gets the lion's share of both. According to Hirtz the relief obtained from the prone position is a pathognomonic sign of large pericardial effusions. Its virtues are only known to those who have practised it systematically. In the instance of the present reporter that daily practice, continued for the greater part of his adult life, led to his devising, years ago, the Infant Rest for the Nursery and for Early Rachitis; the All-fours Exerciser for small children unable to walk through spinal or any other delicacy, and the Convalescent Machine, adaptable to many uses for adults—all of which have been described in PROGRESSIVE MEDICINE. Bed-ridden cardiopaths are deprived of that remedial boon by their inability to assume the prone position in bed. Clinicians may therefore be reminded that a little ingenuity will enable them to construct a prone heart couch adaptable to individual needs, which will relieve the diaphragm of its heart load, the heart of its blood overload, the pulmonary bases of their congestion (thus restoring them to ventilation), and the patient of much of his dyspnea. Cecikas's laudable suggestion for the next therapeutic stage is well inspired, but primitive and crude, with serious mechanical objections. Crawling is too severe a heart effort, too great a muscular strain and too likely to be resented by the knees, the elbows, the shoulders and the wrists. All that is needed is a large edition of the All-fours Exerciser, which carries the whole body weight on wheels and permits the limbs to be both exercised or rested without any load.

The Soldier's Heart. CARDIAC WAR FITNESS AND CARDIOVASCULAR EXAMINATIONS. The present position is admirably summed up in an editorial in the *Journal of the American Medical Association*, February 23, 1918, and in Eugene L. Fisk's letter in the same issue. Perfect health has been defined as the absence of any consciousness that we have a body. This applies with even greater truth to the health of the heart. Dyspnea on exertion reminds us that we have a body. Happily it does not always reveal to its subject that he has a heart, and he should be left, if possible, in that blissful ignorance. Once warned he can never forget the warning. Heart consciousness is itself a disease; often worse than any slight cardiac lesion and too often the starting-point of an incurable cardiac neurasthenia. That risk lays a heavy responsibility upon the decision to send back to the front invalidated soldiers after treatment in hospital for heart strain.

⁵⁰ Corresp.-Blatt f. schw. Aerzte, February 2, 1918.

⁵¹ Grèce Med., August-September, 1917.

An emotional heart is not necessarily an inefficient heart: "Tu trembles, carcasse!" said young Turenne when first under fire. The heart hurry of anticipation is steadied by the stress of greater emotions, or of physical exertions with held breath, as witness the orator's heart. On the other hand, a candidate for active service may be the unconscious bearer of a heart murmur. He has a right to be informed of its presence and of the unavoidable uncertainty of stresses much more severe than any previously imposed upon it. The loudness or the quality of a systolic murmur bears no definite relation to its pathological significance. The latter can at most be inferred from the degree of strain recorded in the avocational history. But the past cannot speak with absolute certainty for the future. That reservation also applies to the interpretation of the results of the physical heart tests. The conditions in the examination room differ widely from those on the firing line.

Fisk reminds us that no weight of clinical judgment based upon a few lives not rigorously followed over long years of life strain, compared with normal lives, can tell against the cold-blooded testimony of the mortality records. The life insurance mortality of cases reported to have functional heart signs only, but limited to rated up policies because of the doubtful diagnosis, was for a time as heavy as that of well-defined valvular cases. With an improved diagnosis, the "functional" heart murmurs show, in certain well-tested experiences, about 50 per cent. extra mortality. The characteristic types of valvular murmur give death-rates ranging from 50 per cent. extra mortality to over 100 per cent.; and it is to be remembered that these figures relate to cases free from subjective symptoms—supposedly favorable types! One large company which accepted a considerable number of substandard lives on rated-up premiums has had approximately a double mortality in these heart cases, although none were accepted over the age of forty years, nor any cases of aortic murmur; while all cases had to be in good functional condition. In the medico-actuarial investigation of the experience of 43 life companies, a persistently irregular pulse showed an extra mortality of 50 per cent. in lives accepted on standard policies. A pulse-rate of from 90 to 100 showed an extra mortality of 72 per cent. These are stubborn facts, which amply justify the conservatism of the companies, and should be considered by the military authorities at the present time, when clinical judgment is inaugurating an excessively liberal attitude toward circulatory impairment. It would indeed be a calamity if the present trend toward minimizing its importance were to lead to a faulty attitude on the part of the profession. Men who now show an extra mortality of from 50 to 100 per cent. under ordinary life strain are not likely to be improved under war strain, even though at the outset the camp training is temporarily beneficial. In conclusion, after all has been said about the relative insignificance of certain murmurs and extrasystoles and tachycardias, must we not admit that, given one of these departures from the normal, the burden of proof is with those who deem it insignificant? Granted that the outdoor life and the regular military drill may benefit a flabby myocardium; granted that the mitral leak may be slight, secondary changes not manifest even to careful

examination, and the heart competent to meet all ordinary demands of civilian life; the question is still, Will it be able to stand up under the storm and stress of the Army? May it not break down in a few years? Is it not an injustice to force upon a man a life-long damage that will shorten his years; an injustice to the Army whose soldier fails perhaps at some critical moment; and an injustice to the Government forced to pay pension or insurance because of the faulty original examination? Should not even slight cardiac faults be noted, and no man be accepted as a soldier without strict proof that the signs are clearly not indicative of any actual lesion?

THE TOLERANCE OF PHYSICAL EXERTION, AS SHOWN BY SOLDIERS SUFFERING FROM "IRRITABLE HEART." Thomas Lewis,⁵² refers to a previous article⁵³ in which satisfactory results are recorded in tabular form. The table compares the after-histories of 239 patients graded out to duty categories with the categories recommended at the time of discharge. The present article describes his method of prescribing exercises and of judging their toleration. The drills now in use are termed B 15, C 15, BC 30, C 30 and D 30, the letter indicating the stiffness of the exercises; the number, the duration of the drill in minutes. B 15 consists of simple movements and calls for no considerable expenditure of energy; D 30 includes many of the stiffest exercises of the army exercise book, and entails thirty minutes' hard work. A few days or a week on the two fifteen-minute drills suffices; a week is usually spent on each of the three thirty-minute drills. Men who promise well may be kept a week or so longer on the highest grades of drill to harden them. Patients on fifteen-minute drills are considered unfit to leave the hospital premises except under escort; those on thirty-minute drills are given afternoon passes freely. This rule stimulates the men to accomplish the thirty-minute drills. All men on exercise C 15 and BC 30 go regularly for route marches in the early afternoon; these are short marches of one or two miles in the immediate neighborhood of the hospital and at slow time. Men in classes C 30 and D 30 are taken for longer marches of four to five miles in the country at a brisk pace in addition to outdoor games. At suitable intervals all men are examined as they come from drills or marches. Coöperation between medical officers and instructors is essential, and much is left to the instructor's discretion. Most medical officers see each man immediately after he has taken the first drill of each grade; others prefer to raise the grade more automatically and to await complaints. At the examinations questions of a general nature only are asked; it is inadvisable for the officer to introduce any symptom into the conversation. Notes are kept on simple forms where each symptom complained of is entered, as well as corroborative signs and readings of pulse-rate, etc. In the average, one or two examinations of each man are made weekly directly after exercise. Medical officers are careful to conceal, so far as possible, the particular symptoms or signs upon which they estimate tolerance.

⁵² British Medical Journal, March 30, 1918.

⁵³ Lancet, February 2, 1918.

The Signs and Symptoms after Drill. The chief complaints of the men as they come from drill are of breathlessness, precordial pain, palpitation, giddiness and fatigue. Objective evidence of symptoms should alone be allowed to weigh. Most patients emphasize a single symptom, and emphasize it constantly; a changing symptomatology can rarely be corroborated by outward signs, and is to be distrusted. Some complain on all occasions, and in equal degree, from the lowest to the highest exercises, others complain little. The medical officer has to contend both with exaggeration and reticence. The tolerance of exercise is to be judged by physical signs, not by symptoms; symptoms are chiefly of value in directing the attention quickly to physical signs. It has happened more than once that when a medical officer had laid recognizable evidence upon a particular symptom a corresponding epidemic broke out in his service.

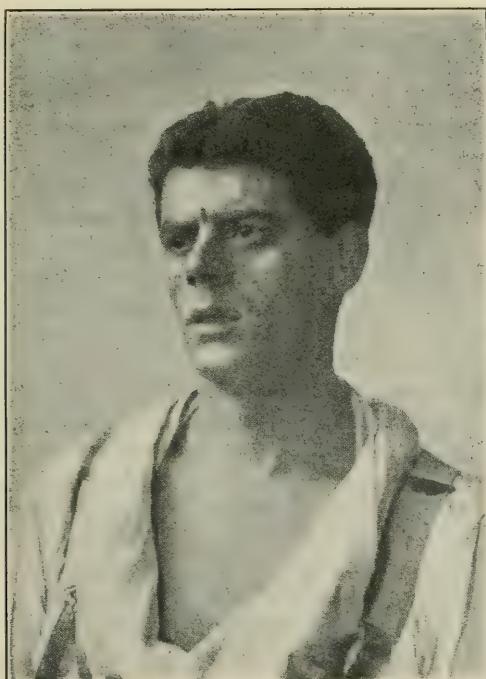


FIG. 12.—Photograph of a patient, aged twenty-eight years, admitted for long-standing and severe "D. A. H." The photograph was taken immediately after fifteen minutes' easy exercises (B 15) and shows the tension of the sternomastoid, slightly opened mouth, and dilated nostrils. The eyebrows are depressed, the forehead furrowed (the central furrow is permanent). The face expresses fatigue and the anxiety of early breathlessness.

The Facial Expression when it exhibits genuine distress is generally that associated with breathlessness. The alæ nasi are expanded, the tendons of the sternomastoid lift, and the lips part a little. In greater distress the alæ nasi are active, the eyebrows are drawn together, furrow-

ing the forehead vertically and yielding an expression of anxiety or actual pain; the mouth opens wider, its angles droop, and the breathing is more audible. If questions are asked the breathing is ill-regulated during the replies; the flow of words is interrupted by inspiratory movements. Not infrequently, and especially when there is fatigue, a slight, but distinct, duskiness develops under or around the eyes, pallor or sallowness of the whole face is not unusual. The facial traits deserve careful observation, for they cannot be simulated; rapid breathing by itself is scarcely sufficient evidence.

Precordial Pain is a common complaint after exercise; it is to be checked by physical examination. With the chest stripped, the hands of the examiner are spread symmetrically over the axillary and submammary regions, as though to steady the chest. This simple action may be sufficient to disclose any hypersensitiveness. In some it is necessary to slip the hands higher, bringing the thumbs over the borders of the pectoral muscles and pressing again; or to proceed further, and while interrogating the patient, to grasp the pectoral folds with increasing firmness between thumbs or fingers. When no hypersensitiveness of the left chest wall is detectable after exercise the plaint of pain may usually be neglected. In extreme cases hyperesthesia is found beyond the chest area, in the skin of the upper arm; not infrequently it also involves the tendons of the sternomastoid muscles. Tenderness of the anterior border of the trapezius muscle suggests a closer examination for signs of early tuberculosis.

A Complaint of Habitual Palpitation is to be neglected as such, but should remind us of the possibility of a persistent excessive frequency. The habitual rate of the heart while up and about, and especially after test exercises may be normal, raised, or very high. To give actual rates might create a false impression, as heart rates vary with circumstances. Particular emphasis is to be laid upon consistency of separate readings. Equally important is a consistency between the drill rates, the routine ward rates, and the rates induced by test exercises. The routine test exercise consists of walking briskly up forty steps. The pulse-rate is taken before, immediately after and two minutes after this test. An alterative test is hopping twenty times on each foot, and raising the shoulders approximately nine inches at each hop. In health the pulse rises to 110 or 120 per minute, but falls to normal usually within one minute.

Giddiness is a common complaint in the initial stages, as a cloud before the eyes. Rotation of surrounding objects is not experienced. As a prognostic sign it has little value.

Fainting is of rare occurrence. A feeble and slow heart action (30 to 50), may be preceded by giddiness, weakness or unsteadiness. The fall is sudden, but rarely heavy. Involuntary movements usually confined to the face and arms, and a general rigidity may be developed; but the tongue is not bitten, neither is the urine passed. Nausea or vomiting may be present. The attack lasts from a few seconds to a few minutes. A history of earlier attacks due to emotion is common. Recovery is always complete, and an attack should not break the routine of drill for more than forty-eight hours.

A complaint of *fatigue or exhaustion* is rarely unaccompanied by pallor, tremor of lips or limbs or breathlessness, as the grade of exercise is raised. Stiffness and tenderness occur in some unpromising cases after short exercise. Pain in the axillary region or back from some particular action during drill does not endure.

Simulation is quite exceptional. Complaints of distress do not deceive, when they are unaccompanied by objective signs, or the signs are incompatible with the complaint. *Overemphasis of symptoms* is undoubtedly common. It is recognized by careful comparison of the objective and subjective. The genuineness of a sudden increase in the reaction to exercise is tested by visiting the man while he is at drill or by imposing simple exercise tests in the examination room or ward. Constant supervision of drill by medical officers has been abandoned as inexpedient; the men work better and more uniformly when left to the drill instructor. No doubt the voluntary production of distress is overlooked from time to time; but it cannot long be concealed from comrades, and many of these resent the deception. If less gross the deception may be contagious; its early discovery is from that time certain. It is met at once by placing the man upon a higher grade of drill without comment. The other and brighter side of the picture is the man who steadily refuses to complain. He taxes the medical officer's power of discrimination most of all. Most patients desire only full examination and consideration, understanding that they are judged for grade of service according to their proved tolerance for work.

THE "IRRITABLE HEART" OR D. A. H. CASES, reported upon by J. C. McWalter,⁵⁴ were treated in a big camp at a Mediterranean Station immediately after their arrival from Salonica, Gallipoli, or Egypt. They were in an earlier and less selected stage (very many having had malaria) than those treated by Lewis, but they were dealt with much on the same lines, in three progressive groups. The men were allowed an extra ration of sugar for the sake of its "synergising" effect upon the heart. The following is a summary of his results: (1) 70 to 90 per cent. of the cases labelled D. A. H. were fit for at least light duty, and of these 20 to 30 per cent. were fit for ordinary duty. (2) A very large proportion of all the cases were fit for ordinary base duties. (3) The only real practical test of the fitness for duty of a man labelled D. A. H. is the time in which, after a given exertion, he regains his normal pulse and respiration rate. If this be under three minutes, he may be regarded as fit for at least light duty. (4) Mere rapidity of pulse may be ignored as of no necessary pathological significance. (5) Many of the cases called D. A. H. are due to excessive thyroid activity, and not to any cardiogenic conditions. The drill or gymnastic treatment seems to point to this, for it invariably aggravates their state, but this does not imply that they are unfit for duty. (6) The ordinary treatment of D. A. H. in ordinary hospitals after perhaps a couple of weeks' rest in bed is not merely useless but harmful, unless some form of gymnastic exercise be added.

FUNCTIONAL HEART DISEASE AND RECRUITING. H. Drinkwater⁵⁵ calls attention to the frequency among the examinees of three signs,

⁵⁴ British Medical Journal, April 20, 1918.

⁵⁵ Ibid., April 27, 1918.

the causation of which he has, for upward of twenty years, found to be invariably associated with a certain vicious habit: (1) Widely dilated pupils. This sign in a young man who is not suffering from marked anemia should at once raise suspicion. (2) On placing the hand over the heart the beat is felt to be markedly accentuated, giving the impression of a thin-walled ventricle. The beat is short and sharp, and in the normal position. (3) The pulse, which one might expect from the character of the heart's action to be full and fairly strong, is small and very compressible. Its rate is hardly, if any, beyond the normal. The contention is that large pupils, marked accentuation of the cardiac impulse and a small compressible pulse form a syndrome which is characteristic. When seen in the same individual they are pathognomonic of the condition. As regards the "grading" of these men, there is no necessity to "defer" them, or to place them in a low category, if they are otherwise quite sound. Indeed, the graduated training is so beneficial that he never hesitates to place them in Grade I.

HYPERTHYROIDISM IN THE RECRUIT. At the meeting of the New York Academy of Medicine, on February 7, 1918, Harlow Brooks gave his recent experience, on active service, of the surprising frequency of this occurrence, usually limited in civilian practice almost exclusively to women. The most striking symptom, which in nearly every instance brings the patient to the regimental officer, is tachycardia. This occurs alike in recruits under initial examination, and after army routine may have upset their emotional and circulatory equilibrium. It is rarely accompanied by arrhythmia. The rate is practically always increased by exercise, though in exceptional cases it may be slowed by exercise, particularly when the attention is distracted. There is also a throbbing of the carotids, brachials and femorals, and, in thin persons, of the aorta, which the polygram could absolutely differentiate from aortic incompetence. The heart sounds are difficult to analyze; in a good many cases there is a soft systolic murmur at the apex, transmitted at times toward the axilla. The capillary return is almost always delayed, and a capillary pulse is simulated. Patients frequently complain of an oppressive bursting pain in the region of the heart, often with areas of hyperesthesia. Other symptoms are rapid flushing and paling, fainting and dizziness. The blood-pressure is very low except in hypersensitive patients. Epinephrin causes an increase in the symptoms; and there is apparently a hypersensitivity to the thyroid. The nitrites definitely increase the symptoms, and there is hypersensitivity to vasomotor dilators. This tachycardia cannot be controlled by digitalis. The sedatives, notably the bromides, give decided relief in some instances, but no effect in others. Next to the tachycardia the most striking manifestation is the emotional instability, invariably present, and leading to epileptoid attacks, outbursts of passion, tears, profanity or possibly convulsive muscular spasms, followed by great exhaustion in which the patient may be so prostrated as to appear moribund. Neurovascular instability may be further shown by the *tâche cérébrale*, by dermographia, by urticarial rashes and by the almost constant symptom of tremor. An index of the strong emotional element is furnished by the types of nationalities

chiefly affected. The Jews lead with 50 per cent. of the cases, then next in order come the Italians, the Irish, and, last of all, the negroes, among whom in about 5000 recruits only a single case, and that one questionable, was seen. Most of the patients are above the average in mental acuity, and the condition is lamentably frequent among promising material for non-commissioned officers. In about two-thirds of these cases one may see a definite thyroid hypertrophy, or at least a prominence of the thyroid. Heredity plays a certain part in the syndrome. A very considerable number give a history of ancestral goiter, particularly on the maternal side. There is also in most instances a familial history of hysteria, insanity, perversions or of genius. Exophthalmos occurs in the long-standing cases, and they present all the cardinal symptoms of true exophthalmic goitre. Rest is the one factor that relieves, and mental and emotional rest is second in importance. The role that emotional shock, fright or mental traumatism plays in the activation of exophthalmic goitre is well established; it explains why so many of these cases occur among young men of draft age. The question is whether the subjects have the making of soldiers in them. Many do recover under the healthful normal routine of camp life. If in these cases careful training is imposed, not too severe until the recruit is prepared for heavy work; if the worry and strain are sufficiently relieved by reaction, by games, camp shows, etc., these men—often of the finest patriotic and spiritual fiber—are certain to make good soldiers. But if they are unhappy, or if some overheavy or premature work is imposed, the recruit either may break nervously, or cardiac incompetence may ultimately develop.

The Pathology and Treatment of Goitre. At the symposium of the Philadelphia County Medical Society, A. G. Ellis dealt with the pathology of the affection. Clinically, goitres may be divided into the non-toxic and the toxic. The former are of chief importance from the stand-point of influence on neighboring structures. They are termed simple or endemic goitre, and include parenchymatous, colloid, cystic and some of the adenomatous forms. Chief among the toxic goiters is the exophthalmic form, with its well-known symptom-complex. The clinical features, rather than the microscopic picture of the removed thyroid, must be the deciding point in the classification of this type of thyroid. As to etiology, McCarrison believes that endemic goitre is an infection, the organisms reaching the alimentary tract through infected soil, water or food, and animal experimentation seems to substantiate his views. Exophthalmic goitre is also believed to be of infectious origin, although not so definitely as the endemic type.

Speaking from the stand-point of the internist, James M. Anders had observed two well-marked instances secondary to rheumatism in which cure was effected by the use of the salicylates. Some cases are of luetic origin and cured by antisyphilitic agents. Most cases of exophthalmic goitre are probably caused by nervous perturbations in subjects predisposed by neurotic inheritances. It is a reproach to our profession that an earlier diagnosis of goitre should not be the rule. In dubious cases the administration of iodine or thyroid extract, with a view of

developing the symptoms, is quite justifiable, as rudimentary cases often yield to well-directed medical treatment. The combined presence of fine muscular tremor of the hands and persistent tachycardia justify a tentative diagnosis of this disease; persistent tachycardia, with marked nervousness, should always arouse a strong suspicion. But heart hurry may be the only feature present; and the condition is frequently overlooked because neither exophthalmos nor thyroid enlargement has appeared. An attempt should be made to distinguish the *hypothyroid* from the more common *hyperthyroid* form of goitre. In the former the gland may be slightly enlarged; is soft but not tender; there is no expansile pulsation to palpation and no "swirling" murmur audible. The body temperature is slightly subnormal, the hands and feet liable to be cold, with marked sweating on slight exertion. Bradycardia is the rule in hypothyroidism, the pulse-rate dropping as low as 40 per minute. In these cases the use of iodine and thyroid extract is required—remedies which invariably tend to aggravate the symptoms of Graves's disease. Hyperthyroidism may merge into a myxedematous condition, with atrophy of thyroid function. The classical symptoms are often missing in hyperthyroidism; and the degrees of thyrotoxicosis vary from slight evidences of overfunctioning of the gland to the most profound signs of changes in the basal metabolism.

H. A. Hare drew attention to the perplexing looseness of our nomenclature. "Goitre" is an inclusive anatomical, non-committal expression. "Thyroidism," with its "hyper" and its "hypo," is independent of anatomical changes in measurement. It predicates a highly complex physiological function, and also its multiple pathological variations. When physiologists shall have completely analyzed the work of the thyroid gland, pathology will perceive more clearly what it is talking about; it will begin to realize that while one thyroid operation is in excess, another is apt to be in default. "Thyroidism," which was the name for our primitive ignorance, is seriously retarding our knowledge. Why not scrap it at once as useless for clear thinking and for accurate inquiry; rather than increase our confusion by attempting to mend it for, at best temporary, service in our ever-progressive study? Hare points out that, in a considerable proportion, we do not have relaxation of the vascular system in addition to the tachycardia. An exceedingly rapid pulse is often found with a very high tension, that is, a pressure of from 160 to 180. He was asked to discuss the action of the heart in exophthalmic goitre, but felt that he ought to decline because he knew so little about it. To the three types of hyperthyroidism referred to should be added a fourth, in which there is enlargement of the gland with excessive secretion, but in which the interlocking directorate of the other parts of the body compensates. This is seen in pregnancy. In *treatment* the rest cure is invariably indicated in the presence of much tachycardia. There is little use in trying to treat an exophthalmic goitre patient who lacks the means of a real rest cure: such cases should be sent to the surgeon earlier. As regards drugs, he has had little results from digitalis. So far as the pulse is concerned, the best results have been obtained from veratrum viride in 8- to 10-minim doses of the tincture five or six times

a day. He is not, however, able to give a scientific explanation for the benefit secured.

THE NON-SURGICAL TREATMENT OF GOITRE AND ITS COMPLICATIONS was discussed by C. E. de M. Sajous. Fifteen years ago he had stated that simple goitre should be regarded as a defensive reaction of the thyroid apparatus against one or more pathogenic agents of endogenous or exogenous origin, ingested with water in the form of a lime salt, or from various organisms or toxins originating from the tonsils, dental abscesses, sinus or nasal disease, impacted or retained feces, etc. When the defensive apparatus was normal, the gland did not become enlarged; but when, either through heredity or local lesions due to diseases of childhood, etc., its protective structure was reduced to the bare needs of normal catabolism, congestion, with hyperplasia was the main result. If the hyperplastic tissues are able to carry on the defence, no hyperthyroidism appears; but if their proportion exceeds that limit, the secretory activity of the gland is correspondingly increased, with Graves's disease as an advanced phase. The treatment is to remove the cause. When pressure symptoms are present, surgical measures may become necessary; but when the growth is purely hyperplastic, elimination of the causative toxin, with thyroid substance to aid the antitoxic process and to relieve the overworked gland, may yield excellent results. In Graves's disease, with the additional help of vasoconstrictors and rest, cure may be obtained in most instances. Surgery is resorted to with unwarranted frequency in such cases.

THE CONSTITUTIONAL DISTURBANCE OF TOXIC GOITRE AS INFLUENCED BY SURGICAL THERAPY was considered by C. H. Frazier. The four groups of toxic goitre include: (1) The adolescent type, in which the hypertrophy is efficiently compensatory. Later, however, this type may become extremely toxic, namely, in young girls from sixteen to eighteen. (2) A group met with between thirty and forty in which the patient has had an adenoma for years and lapses into a toxic state. Their surgical therapy is favorable. (3) A group in which the cases are toxic from the beginning, presenting the picture of exophthalmic goitre. (4) A group including any of the toxic varieties of comparatively long duration, where permanent relief is not to be expected. Two varieties, to be carefully analyzed before operation is sanctioned, are: (1) The woman with a small adenoma and a group of nervous phenomena; (2) the patient in which the condition is characterized chiefly by tachycardia and slight enlargement of one lobe. In the first the outcome has not been gratifying in his experience. In the second group operation has been beneficial in about half the cases. According to Means, DuBois, and others, the rise in basal metabolism indicates the degree of toxicity of the gland. He employs this test to gauge, not only the toxic operative risk and as a guide to treatment, but also the ultimate effects of the operation. Clinically, some extraordinary results have been reported following a partial thymectomy in hyperthyroidism. In mild toxic goitre, while operation may not be imperative, there is a substantial basis for early interference. In the graver forms the cases are all hazardous. Early in the disease a lobectomy may occasionally be justified

as an initial step. In cases of longer duration, under no circumstances should more than a ligation be attempted. The mortality in his series of operations for toxic goitres has been 3.5 per cent. Among the constitutional disturbances, operation tells most upon the nervous phenomena, and next, upon the nutritional disturbance. The circulatory relief depends largely on the condition of the heart at the time, tachycardia being the most persistent symptom. As to the amount of tissue removed, he has increased the extent of the resection so that not more than one-sixth of the gland is conserved. Using the term "cure" in the sense of fitness for customary duties, although moderate tachycardia and nervous disorder may persist, he can record 70 per cent. of recoveries.

THE BLOODVESSELS AND THE VASCULAR CIRCULATION.

The Increasing Popularity of "Arteriosclerosis" as a Form of Death Certificate is causing anxiety and some dismay in the Registrar-General's statistical department. Since the term was first used in the Registrar-General's tables in 1911, the deaths so returned have grown continuously from 3675 in 1911, to 8012 in 1916. As Stevenson observes in his recent review of the statistics of the year, it is impossible to suppose that the disease can have in reality shown any corresponding increase of fatality during so short a period. Another influence at work was the issue by the Registrar-General in 1912 of suggestions to medical practitioners as to inadequacy of "old age" as a form of certificate in cases in which death was due to disease. The deaths attributed to old age declined considerably in subsequent years. Stevenson further points out that until 1901 nearly all deaths from lesions of the cerebral arteries were grouped together under the heading "apoplexy." This heading was first subdivided into "cerebral hemorrhage, cerebral embolism;" and "apoplexy, hemiplegia," 55 per cent. of the deaths being attributed to the latter; and by 1916 the proportion had fallen to 25 per cent. His comment on this is that twenty years ago it was customary in such cases to certify the conditions as apoplexy, or paralysis resulting from cerebral hemorrhage. Then the matter was traced one step further back to the vascular lesion; and now another change is in progress by which the cause of the cerebral hemorrhage is recorded, and the death is therefore allocated to arteriosclerosis. He thinks that a further stage of the same process may possibly even now be transferring some of these deaths to Bright's disease in so far as it is regarded as causing arteriosclerosis, while a still further stage would transfer them to the toxin (lead, gout, etc.) underlying the renal or arterial disease. It is clear that a spurious decline in the registered mortality from certain causes dependent on arterial disease must result. An investigation of this important matter is in hand, but has been interrupted by the war.

Aortic Incompetence Produced by Shell Explosion. Three instances have been recently observed of a presumably traumatic rupture of healthy valves, in soldiers free from syphilis or rheumatism, as published by A. Cramer, J. Brossard, and J. Heitz.⁵⁶ The sudden alteration of

⁵⁶ Arch. des mal. du cœur, 1918, vol. xi.

pressure caused by explosions has been known to rupture the lungs without external injury (Sencert), to cause hemorrhage into the central nervous system, and hematuria. It is not therefore unreasonable to believe that, similarly, the aortic valves, which, according to Barié, are the most delicate of the cardiac valves, might thus be ruptured.

Postoperative Thrombosis and Embolism. Charters J. Symonds,⁵⁷ in his suggestive comments on their etiology, states that it is some injury that determines a joint infection in septicemia. For instance, acute suppuration of the knee may follow the manipulation of a septic compound fracture of the femur, or of the ankle-joint. A surgeon scratched his finger while operating on a septic case; this healed in two or three days, and he was apparently quite well. He overreached to pluck a flower and felt a "rick" in his "shoulder," probably in one of the muscles. Four hours later he had a rigor and an acute phlegmon developed in the pectoralis minor, from which he nearly died. A patient may be in apparent health, in whom a septic infection of the blood is present. So long as the infective agent is within the endothelial lined vessels the individual is protected, and the blood ultimately destroys the bacteria or their products. Once this endothelial barrier is broken, as in that instance by a rupture of muscle fiber, the infective agent escapes, and multiplies in the bruised tissue, in the small blood clot, and in the unprotected normal tissues. Can we adopt any means of limiting the extension of the thrombosis? The disaster occurs chiefly when primary union has taken place and when no sepsis has been manifest. It is just in mild phlebitis that the detachable clot is formed. In worse cases the clot is adherent and not likely to be detached. Finally, when the patient is moved to a sofa or sits up, the edema of the foot and ankle is discovered.

It is a common observation that postoperative pulmonary embolism is seen only in connection with operations on the abdomen, or the inguinal canal, scrotum, or rectum. Has anyone seen a case occur after an operation above the diaphragm? And again has the complication been recorded in children after any kind of operation? The common feature in these two conditions is free movement. It is impossible to keep a child quiet; he will move his legs about, and turn on his side after an operation for acute appendicitis. Symonds believes it is in movement that safety lies. It is the common practice to adopt the dorsal position with knee pillow, after abdominal operations, and also after parturition. Looking upon this position as tending to slow the current, as possibly determining thrombosis, or at any rate its extension, he abandoned the method in all but grave cases of suppurative peritonitis; and for many years no case of embolism has occurred in his practice. The hips and knees are moved three times a day, and the patient is encouraged to turn on his side as soon as possible, and is made to lie quite flat in the bed for part of each day. Is it necessary to keep the parturient woman on her back for days together? From his experience in abdominal operations, he thinks early movement of the limbs and frequent changes of

position would diminish the number of cases of embolism. The suggestion that movement of the body interferes with the success of abdominal operations of any kind, is disposed of by the fact that vigorous vomiting even for a couple of days seems to have no injurious effect. He bases upon these and other considerations the following contentions: (1) Pulmonary embolism does not occur after operation above the diaphragm. (2) Nor in children. (3) The common factor in the after-treatment of these two examples is freedom of movement. (4) Usually after abdominal operations movement is restricted, the dorsal position is enforced, and the knee-pillow adopted. (5) The inference is that this practice determines massive thrombosis by slowing the circulation. (6) It is suggested that the above restrictions should be abandoned, together with the knee-pillow, and daily movement insisted upon.

Oxygen Unsaturation in Venous Blood. By this is meant the difference in quantity between the oxygen present in the venous blood (drawn from the median basilic) and the total combining oxygen capacity of the hemoglobin. C. Lundsgaard⁵⁸ records, in three separate papers, his comparative findings in the compensated and in the uncompensated stage of circulatory disturbances, in contrast with the normal standard which varies between the limits of 2.5 and of 8 volumes per cent. for the unsaturated oxygen. In 12 patients with compensated heart lesions, the unsaturation was found within these normal limits. In 4 others with uncompensated heart disease the unsaturation was greater, ranging from 9.7 to 15.2 volumes per cent. Forty-six determinations were made in a set of 5 patients with compensated circulatory disturbances. Values practically within normal limits were found in 4 of them, with regular pulse. In 1 patient with mitral insufficiency and arrhythmia perpetua, they varied extremely. In 1 reading the value was within normal limits, in 5 others it was raised, being in one instance even higher than in most cases of uncompensated heart lesions. A close parallelism may be drawn between these direct determinations and the oxygen consumption calculated from his previous experiments in cases in which the blood flow was determined directly by the nitrous oxide method. His third paper deals with the record of 103 oxygen unsaturation determinations in 5 patients with uncompensated heart diseases. Values within normal limits were found only under two circumstances; (a) in a stage of full compensation, and (b) in a stage of incompensation in which the symptoms were rapidly lessening. Values above the upper normal extreme were met with under three circumstances; (a) during incompensation, (b) during compensation, just before the clinical symptoms of incompensation had developed, and (c) at times in patients with auricular fibrillations, though in a condition of complete and stable compensation. Here again there was a close parallelism between the direct oxygen unsaturation estimations and the values for the oxygen consumption calculated from previous experiments on the blood flow (minute-volume of the heart) in similar clinical conditions. He suggests, from the experience gained with patients under digitalis, that

the oxygen unsaturation index may afford objective as to the therapeutical activities of the drug.

Intestinal Venous Stasis, a potent predisposing factor of tonsillitis, of appendicitis, and of many other infective processes, is specially insisted upon by Fenton B. Türck,⁵⁹ of New York, whose researches into the Submucous Path of Bacterial Elimination are well known. He summarizes the aims of treatment as being: (1) To reduce fatigue of the hollow muscle; (2) to prevent fatty acid intoxication; (3) to prevent intestinal retention; (4) to prevent absorption of intestinal flora; (5) to correct acidosis; (6) to reduce splanchnic venous stasis; (7) to increase immunity; (8) to maintain nourishment. The general measures to attain these objects are: Regular feeding periods to conform to the curve of muscle work and relaxation. Food rich in the salts of calcium, magnesium, potassium, and sodium should be provided to replace the bases lost through acidosis. Vegetables should be steamed for several hours, rather than boiled, so that the salts are retained for easy digestion, passed through a wire sieve, and made into purée. The intake of fat should be reduced to minimum requirements; we should prohibit heated fat and guard against stale fat. Olive oil is useful in the recuperative stage. Allow no extractives in the food, no soups, no bouillon. Protein without extractives is completely digestible in the upper part of the digestive tract. Older children may be given extract-free meat. For a time the total protein intake may be reduced. Baths, both foot baths and sitz baths, containing salt with soda, beginning at 105° F. and gradually raised to 110° F., also are indicated. Medication depends upon whether we are dealing with an acidosis in the chronic or acute form. To prevent the passage of bacteria from the intestinal tract, demulcent Irish moss, liquid vaseline, and fine bran have been found effective. In severe acute cases, gastric and colonic lavage is paramount. The latter is also essential in the subacute and chronic cases; but it should be administered by the gentle "pneumatic syringing" method. Alkaline demulcent injections are also indicated. These cases are the special field for autogenous vaccines.

The following is Türck's method of preparing extract-free meat: Chopped up beef, mutton, or chicken is ground in the meat grinder, and the juice is pressed out; or it may be left in cold water overnight and then squeezed out. The juice is thrown away and the meat placed in a steamer with a little cold water and steamed for two or three hours. The juice is discarded, and the pulp remaining represents the nutritive part of the meat with the unnecessary and poisonous part removed. It may be made palatable in a variety of ways. Milk or cream may be added with a little flour, heated, seasoned, and spread on toast. It may be made into small patties, dipped in egg, and broiled. A mixture of half bread crumbs and half meat may be flavored with bay leaf or curry bound together with milk and egg, and baked in the oven as a veal loaf; it may be eaten hot or cold. The extract-free meat may be mixed with a little curry, and milk added; it may then be placed in a porcelain dish,

⁵⁹ Boston Medical and Surgical Journal, May 10, 1917.

surrounded with a border of rice, covered with beaten white of egg, and quickly heated in the oven. The meat may be made into cutlets and heated with a little butter in the pan, but not fried.

Angina Pectoris. At the debate before the Chicago Institute of Medicine some prominence was given to the discussion of Clifford Allbutt's new views as to the cause and the site of production of the characteristic irradiating pain, in 4 important communications published in the *Journal of American Medical Association*, April 6, 1918. E. Fletcher Ingals, with the collaboration of W. R. Meeker, thus summarizes his considerable clinical experience. The pain in angina pectoris is not usually in the heart and the left arm but rather along the course of the aorta and larger arteries. The pain appears, at least in many cases, to have no relation to the condition of the myocardium or to the obstruction of the coronary arteries. A more hopeful prognosis than that of the usual conception of this disease may be assured under proper care and treatment, *a very important part of which is abundant rest, with heart tonics as needed.* The sublingual administration of fresh hypodermic tablets of nitroglycerin in large amounts to relieve pain is of great value. The failure of nitroglycerin is most often due to the wrong mode of administration, deterioration of the preparation, and inadequacy of the amount.

E. R. Le Count, who discusses the pathology of 60 deaths from circulatory difficulties of blood in the coronary arteries, or with lesions generally regarded as caused by such difficulty, divides them into two groups: One of 34 deaths from fibrous myocarditis with sclerosis of the coronary arteries; the other of 26 instances of more or less acute occlusion. He offers the following critical comments: It might be assumed in the absence of any reliable evidence of the angor associated with a sense of impending death, that none of these 60 persons suffered from angina pectoris. It can only be stated that in all likelihood many died from true angina in a first attack. As to Allbutt's contention that the lesions are not located in the coronary arteries but in either functional or structural alterations of the aorta, anatomists have always questioned where the heart ends and where the aorta begins. Since the lower part of the aorta (as well as of the pulmonary artery) receives its blood supply from small branches of the coronary arteries, passing up, and anastomosing with similar vasa vasorum from the bronchial and pericardial arteries, it might be best to regard the proximal few centimeters of both as a portion of the heart. It is not unlikely that with sclerosis of the coronary arteries a difficulty exists in maintaining an adequate supply of arterial blood in that proximal part from insufficient anastomosis with the vasa vasorum which come down from the bronchial and pericardial arteries; indeed, these last vessels may also be the seat of sclerosis. It is easy to conceive that the coronary branches which supply feed to the roots of the pulmonary artery and aorta are end arteries, in much the same way as the larger branches to the myocardium are terminal; and to remember that although a collateral anastomosis exists in the heart between the two coronary arteries and also between the coronary vasa vasorum of the aorta and other vasa vasorum to the aorta from the

pericardial and bronchial arteries—with the development of sclerosis or of some more acute obstruction, the compensatory circulation may prove inadequate, or may not be promptly enough established, to prevent either angina pectoris with death, or death so unexpectedly that there is no opportunity to determine whether symptoms of angina did or did not occur.

THE RELATION OF CORONARY THROMBOSIS TO ANGINA. That it causes some of the attacks, that it is not always fatal, that it produces a set of symptoms available for its clinical recognition (or for that of embolism in some cases), and that the electrocardiograph may prove of diagnostic service in the future—are the main points discussed in J. B. Herrick's communication. Cohnheim's sweeping conclusion from canine experiments that, the coronaries being terminal, the obstruction of one of them was inevitably fatal within two minutes has been challenged by anatomists, pathologists, experimental workers, and clinicians. Dissections proved that there were anastomoses, not merely capillary but sometimes visible, between the right and the left coronary. This was proved by various other means of examination—by Spalteholz by rendering the heart translucent, by roentgenograms of injected vessels, etc. The pathologists, finding many obstructions of long standing urged the existence of a reasonable degree of blood supply from some other source than the one coronary artery. Later experimenters have had more favorable results than Cohnheim. Porter, of Harvard, was one of the first to keep his animals alive after ligation of large coronary vessels. This means that the coronaries are not, in the strict sense, terminal arteries; and carries the clinical suggestion that obstruction of the coronary, even of a main branch, is not necessarily fatal. From that stand-point, clinical cases must be classified into groups; (*a*) instantaneous death by sudden stoppage of the heart and respiration; (*b*) obstructive heart pain, and early death, within a few minutes or hours; (*c*) severe symptoms, but death deferred for hours or for months, with possible recovery; (*d*) slight pain which may be passed off as a neuralgia or pleurodynia. In many hearts there are scattered patches of fibrosis, some of which are surely due to minor obstructions. If a large one may cause sudden death with pain, why not a smaller one slighter symptoms without death? In group (*d*) the patients, as a rule, are from thirty to fifty to sixty years of age; some have signs of definite cardiovascular disease; some have not. In all the cases thus diagnosed, pain has been a striking feature. The patients who have previously suffered describe this attack as the worst they have ever had. The pain may be substernal or precordial, be referred to the epigastrium, and may or may not radiate to the arms. It lasts longer than in typical angina; in one or two cases it amounted to a typical status anginosus in which one severe attack succeeded another. Huchard sometimes found that there was no pain. Not infrequently the pain stops after a few hours, even though the patient lives for a long time. Often there is nausea with vomiting; the patient is frequently in a condition of collapse. A striking fact is that the mind remains clear.

The pulse is generally small, sometimes almost imperceptible; frequently rapid, more rarely slow; frequently running, sometimes irregular. The heart tones are strikingly feeble. The blood-pressure is low, and in cases going from bad to worse, gets lower and lower. Pericardial friction is not infrequently heard over the infarct in the myocardium. If the patient lives a few days or weeks, he generally shows signs of myocardial weakness; sometimes edema of the legs, ascites, albuminuria, etc. In other cases the symptoms are those of chronic fibrous myocarditis; dyspnea on exertion, anginal attacks, cyanosis, cough, etc. Another striking sign may be an acutely developing emphysema obscuring the cardiac dulness, as von Basch had already described. Frequently there are rales due to edema of the lungs. Some patients preserve not only a clear mental condition but some muscular strength. Many attacks resemble closely a surgical subdiaphragmatic accident such as pancreatitis or perforated gastric ulcer. In one patient the coronary obstruction, if present, had a most remarkable after-effect. After frequent attacks of angina on walking, for several months, he had a frightful attack. Following that he never had any attack of the ordinary paroxysmal variety. Perhaps a roughened coronary vessel partially obstructed had produced the painful seizures, after the manner of intermittent claudication. Then a thrombus formed suddenly at some narrow point and put that district out of function, with resulting fibrosis, to which the heart became accustomed, and which did away with the varying and relative ischemia of the myocardium.

Herrick believes it may be possible in these cases to make a fair approximation to a diagnosis, as in three instances in which the clinical symptoms were carefully studied, necropsy showed coronary obstruction. At his suggestion Fred. M. Smith studied experimentally the coronary arteries in dogs. He first injected the arteries, registering the pressure with a mercurial manometer. At times he could inject the right coronary from the left or *vice versa*. The second point he tried to establish was the mortality from ligation. One dog out of eleven in which he ligated the ramus descendens of the left side died; ten lived. In the circumflex the mortality is always higher. These experiments concern acute obstructions. There is a great field for experimental work in producing slowly forming obstructions. Third, he was able to produce, with reasonable certainty, lesions in fairly definite areas by ligation of various arteries. In general, the endocardial and subendocardial changes were more extensive than those in the subepicardial tissue. Lastly, he studied the electrocardiographic changes produced. Tracings were made before, and soon after, the operation to get the immediate change; then at varying intervals of minutes, hours, days, weeks, and months, and the irregularities were noted with the object of ascertaining whether for any definite lesion in the heart muscle or in the conducting system, there was a definite electrocardiogram. May it not be that when we encounter an abnormal electrocardiogram in the human being with symptoms suggestive of coronary thrombosis, we may be able to state with some degree of certainty that the patient has had obstruction in a particular portion of the coronary system? In one instance, that of a

patient who died, five months after the obstruction, the electrocardiograms turned out to be right. The necropsy revealed the lesion.

Clifford Allbutt's Views. Robert Babcock's paper is mainly devoted to their reasoned exposition, as follows: The angina of Heberden is a pain located in the ascending aorta, or in its suprasigmoid portion, and is due to tension or stretching of the fibrous coat, the adventitia. Since, he says, Facinian bodies have been demonstrated in the fibrous coat of the artery, in this respect the pain is like the pain of intestinal colic, or any pain caused by stretching of the fibrous investment of some abdominal structure or dragging or pulling on the omentum. He believes the cause of this pain is aortitis, which may be chronic and subacute, or acute with acute exacerbations. The proximal causes are the usual factors of senile atheroma, but more especially three influences—syphilis, influenza, and rheumatism. He can only discuss a few of the eighty hypotheses of angina that Huchard had collected, namely, coronary disease and cramp of the coronaries, spasm of the heart muscle, distention of the heart muscles, etc. Regarding coronary disease one might say that the majority of old people show more or less coronary sclerosis after death, and yet most of them never suffer from angina. On the other hand, in many who had suffered from typical angina no coronary disease could be found. He regrets that clinicians and pathologists do not investigate carefully the condition of the adventitia of the artery. He doubts that the heart muscle itself is capable of pain, because the ganglions and nerves of the heart, he believes, are motor rather than sensory. Nevertheless, when disease of the heart does produce pain, he thinks the pain is caused by tension of the fibrous investment of the structures of the heart. He quotes from Kaufmann that it is only sudden occlusion of a main coronary artery which produces pain. In spite of this he believes that the pain of sudden blockage can be distinguished, and is to be distinguished, from typical Heberden's angina, *viz.*, exactly by the symptoms which Herrick has mentioned—not only that the pain is frequently pericardial or epigastric, but that there are certain other associated symptoms which do not properly belong to Heberden's angina, namely, dyspnea, disorders of the pulse, failing circulation, and failing heart. The blood-pressure in some cases may fall; in others it remains unaltered, while in others it rises. He cites various observations from Mackenzie and others that it is not constant during angina, neither are collapse, edema of the lungs, vomiting, etc., as in coronary embolism. He regards such symptoms if they occur, as epiphenomena, and due to associated lesions. He believes that the sudden death in Heberden's angina is due to inhibition; a manifestation of the impression made on the vagus by the pain. Allbutt's hypothesis seems likely to explain the diversity of findings recorded, and the reason for the divergent views concerning the nature and cause of the pain. Allbutt rejects the theory of angina being due to distention of the heart muscle, citing the statements of the late John H. Musser, and others, who recognized cases of typical angina in which the angina totally disappeared after dilatation was set up by mitral insufficiency, and reappeared with the return of compensatory hypertrophy. He thinks that the

theory of spasm of the heart muscle is not tenable. Spasm of the coronaries and intermittent claudication he looks upon as makeshift views to suit the great variety in the morbid changes found. In some hearts suffering with angina the coronaries were not diseased, and in others they were greatly diseased. On the whole, Allbutt's theory might best explain the overwhelming majority of cases, both as to causation and in their symptomatology, and also the mode of operation of the measures which relieve angina.

Blood-pressure. H. A. Hare⁶⁰ contributes some illuminating remarks to the question as to the value of the blood-pressure test in examinations for military fitness. The sphygmomanometer may, owing to nervousness and apprehension, give a record fifteen to twenty points higher than that usually present. Thus a reading of 185 systolic may have settled down at a second examination, after a period of rest, to an average pressure of 160 or 165. The genuine significance of blood-pressure ranging from 160 to 180 depends more upon what is found as to the heart and as to the kidneys than upon any other factor. If the kidneys are right, a pressure of 180 has not the evil significance that a pressure of 160 would have if the heart were feeble or tired and the kidneys much impaired. If the urinary examination is fair, the question as to the individual's efficiency should be determined not alone by the ordinary methods of examining the heart, but also by studying the difference between the diastolic and systolic pressure after rest and after exercise. If the diastolic pressure is constantly high, above 110 or 115, the high systolic pressure means a greater strain upon the heart. A difference of only ten to fifteen points between the diastolic and systolic pressure in a case of high tension means in all probability that the reserve power of the heart is so impaired by exhaustion or disease that a cardiac crisis, or the development of rapid cardiac failure may be expected. Whenever twenty to thirty steps upstairs at a fair speed are followed by no rise in systolic pressure, but by a fall, it is clear that the individual is incapable of being subjected to any severe physical or mental stress. The mere height of the systolic pressure, unless so extraordinary as to endanger the bloodvessels, has nothing like the significance attaching to a very high diastolic pressure, a poor pulse-pressure or a definite fall in pressure on moderate exercise. Many with a high blood-pressure have developed a compensatory hypertrophy which enables the heart to overcome this *vis a fronte* with impunity; whereas many others with a comparatively low systolic pressure are constantly on the border-land of more or less acute cardiac break-down. Thus, there are few conditions in military or civil practice in which our diagnostic and prognostic acumen is so severely tested as in the abnormal cardiovascular states; few in which our professional judgment may earn so much credit or discredit, and is more directly answerable for the immediate, and possibly the remote, future and happiness of the patient—in striking illustration of the fact that he who attempts prognosis and diagnosis on one major symptom is at fault, and that correct and accurate conclusions

⁶⁰ United States Naval Medical Bulletin, October, 1917.

can only be reached by thorough investigation and a careful balancing of all the pros and cons in the case. In particular, Hare lays stress on the value of an estimation of the non-protein nitrogen in the blood for its prognostic importance in renal cases; although, like all other factors in diagnosis, this should not be given exclusive importance. The recognition of a high non-protein nitrogen percentage, in association with the other symptoms he describes, will, like the reading of a great change in barometric pressure, put the physician in a position to be ready for the storm that may arise.

SYSTOLIC, DIASTOLIC, AND PULSE-PRESSURE; AND VASOMOTOR EFFICIENCY. The third edition of George W. Norris's *Blood-pressure*, its Clinical Applications, confirms the well-known value of Korotkow's method (1905), still insufficiently adopted in practice, and recommends Nicholson's new mercurial clinical instrument for the identification of the five auscultatory phases. Crampton's test for vasomotor efficiency, in which he places some reliance, compares the pulse-rate and systolic pressures in the recumbent and in the erect postures, there being normally in the latter an increase of about seven beats a minute and of 10 mm. Hg. The systolic and diastolic pressures being commonly 120 and 80 (with a difference or pulse-pressure of 40), the "cardiac load" has therefore been considered to be $\frac{4}{8} \%$, or 50 per cent. of the diastolic pressure. In hypertension this pulse-pressure percentage of the diastolic pressure may be greatly raised; and prognostic importance has been ascribed to it. But Norris has not found "the cardiac load" of any value in the estimation of circulatory efficiency. A systolic pressure constantly at 160 mm. Hg. or above, and a diastolic of 100, are to be regarded as definitely pathological at any age. But a constant diastolic pressure of 100 mm. Hg. indicates high blood-pressure, whether the systolic is 180 or 140. The diastolic being far less subject to temporary variations and a better index of the mean pressure than the systolic, it is generally the more important of the two.

THE BLOOD-PRESSURE TEST BEFORE OPERATIONS has been much debated. According to J. Blomfield's⁶¹ wide experience, anesthetics, properly chosen and given, make little call upon the heart, and when an operation is necessary it is extremely seldom that it should be banned on the score of cardiac risk. J. Davenport-Windle⁶² expresses a similar view. He made trials on 90 healthy industrial school boys, and found that those in the first athletic squad gave such changes in pulse-pressure that, had the test been a reliable one, they ought to have died from cardiac failure then and there. He also made tests in the out-patient department on a large number of old people with signs of cardiac failure, and found in most of them that the difference in systolic and diastolic pressure reading after exertion indicated that they had strong hearts, although nearly all of them showed marked symptoms of cardiac failure after the exertion. When a supposed test for the reserve of cardiac power indicates heart failure in a group of trained athletes and a large

⁶¹ United States Naval Medical Bulletin, October, 1917.

⁶² British Medical Journal, February 2, 1918.

reserve of power in hearts on the verge of failing, it is a worthless and dangerous criterion.

CASHMAN'S PULSE-PRESSURE TEST BEFORE OPERATIONS. Z. Cashman's⁶³ elaborate paper gives the following test: The pulse-rate and blood-pressure are taken in the recumbent and in the standing positions; then the patient walks rapidly or uses dumb-bells, and the pulse-rate and blood-pressure are again taken in the standing and recumbent position. In normal persons the systolic pressure rises on standing and after exercise, whereas in cases of cardiovascular debility the systolic blood-pressure falls on changing from the recumbent position. Exertion calls forth a compensatory response on the part of the cardiovascular system with a rise of both the systolic and diastolic blood-pressure. But as the diastolic pressure rises less than the systolic, there is an increase in the pulse-pressure (or the difference between the systolic and diastolic pressures) as compared with that before the exertion. On the other hand, a fall in the pulse-pressure, whether due to a fall in the systolic pressure or to a rise in the diastolic pressure, shows that there is a poor response to mild strain on the part of the cardiovascular system, and it is usually accompanied by breathlessness, dizziness, or fatigue. This is often seen in visceroptosis, prolapse of the uterus, and gall-bladder disease. It may be due to a damaged myocardium or to a cardiovascular system working with so little reserve power that it may fail if subjected to sudden strain. In practically all operations the cardiovascular system is exposed to strain, and the risk of death from cardiac failure is considerable when this test shows diminution of the pulse-pressure on mild exertion.

Intrathoracic Operation. In their observations on the "Surgery of the Chest," A. L. Lockwood and J. A. Nixon⁶⁴ utter some important general principles. From their experience, and intimate association with Duval, they believe that unless surgeons have kept their chest cases under their own observation until convalescence is complete, it is impossible for them to form correct conclusions as to the value and ultimate results of their treatment. In addition the complete intrathoracic operation stands at present in some danger of being performed upon cases in which it is neither necessary or justifiable. They therefore do not advocate it for hemothorax *per se*. Their conclusions and methods do not accord with those in vogue elsewhere or advocated in recent articles, but they are convinced that their procedures, especially the early resuscitative methods, the diagnostic measures, the exact localization of missiles, the operative technic and the postoperative treatment are essential and indispensable.

As regards *resuscitation*, immediately on admission to the casualty clearing station the patients are dressed in clean pajamas and laid between warmed blankets, in a heater if possible, with the injured side dependent. Continuous rectal administrations of sodium bicarbonate and glucose (5 per cent. each in water) is started. Intravenous sodium bicarbonate (2 per cent.) is given if required, and in a large percentage of severe cases immediate blood transfusion (600 to 800 c.c.) is adminis-

⁶³ American Journal of Medical Sciences, 1917, vol. cliv.

⁶⁴ British Medical Journal, January 26, 1918.

tered with the minimum of disturbance to the patient, preferably by the new "No. 17" or the Kimpton Browne tube. Hot drinks by the mouth, especially cocoa, are given freely, but no stimulants whatever. As Crile has insisted, sleep is the great restorative, and should be procured by every means and device, such as a plug of cotton-wool in the ears, subdued lights, perfectly quiet surroundings and omnopon or morphine, the former for choice. Urgent dyspnea from hemothorax or pneumothorax should be relieved before operation by aspirating. If fresh hemorrhage is suspected, the aspiration should be partial and combined with oxygen replacement.

DERMATOLOGY AND SYPHILIS.

BY WILLIAM S. GOTTHEIL, M.D.

DERMATOLOGY.

Bromoderma. In our 1915 review this subject was last mentioned in connection with a bromide eruption of rather unusual type.¹ Lane has recently recorded an instance of a tuberous bromide eruption that is, in my experience, not very uncommon and quite typical. The patient was a female infant, five months old, who had suffered from "convulsions" since birth, and who had been given potassium bromide in



FIG. 13.—Bromoderma tuberosum. (Case of J. E. Lane.)

8-grain and potassium iodide in 4-grain daily doses for some weeks. The eruption was vesicular in the beginning, and had been diagnosed as varicella. When seen by Lane, however, there were some 20 circular or polycyclic, vegetating, condylomatous-appearing growths upon the face; their color varied from that of venous to arterial blood. The smallest beginning lesions, however, of which there were a number on

¹ PROGRESSIVE MEDICINE, September, 1915, p. 105.

the body and some on the face, were distinctly vesicular, and might readily be taken for chicken-pox. Usually, however, this skin lesion is so characteristic that it can hardly be mistaken. It occurs in infants and children, and mostly on the face and extremities. Whether vesicular or not in the beginning, the lesions soon grow into fleshy, skin-colored or darker, tuberous masses, which, save for a slight increase in size, remain indefinitely. There are no inflammatory symptoms, and the eruption does not bother the child. Even when a single small lesion only is present, it is so unlike anything else that it can be easily recognized.

Chancroid. Some years ago I² criticized a newly proposed vaccine treatment for chancroid in these pages; and the fact that but little has been heard of it since that time justifies my remarks. In the extended discussion on the treatment of this lesion in the Section on Genito-urinary Diseases at the Sixty-eighth Annual Session of the American Medical Association, New York, June, 1917, but one speaker even mentioned the vaccine, or rather the bacterin treatment; apparently it has not been successful enough for even occasional recommendation.

Even allowing for the fact that chancroid, being seated usually upon the male genitals, is most often classified as a genito-urinary affection, which it really is not, I have a very definite impression that the disease, especially in its severer forms, is much less frequent here than it used to be. The cases seen, even in large clinics, are few. It is quite possible that improved general hygienic knowledge, and greater attention in general to cleanliness after intercourse is responsible for this. Robbins and Seabury³ differentiate four kinds of chancroid clinically; to my mind a rather unnecessary refinement in diagnosis. Their first is the ordinary chancroid, a clean-cut ulcer with characteristic punched-out appearance and undermined edges. Their second variety is the chancroid, beginning as a papule, becoming a pustule, and finally developing into a deep crateriform ulceration; this difference in the earliest stages of the lesion is simply due to anatomical peculiarities of the skin involved, appearing in the firmer tissues of the perineum and labia. Their third variety looks doubtful to me, and the authors confess that it is the sore most frequently confounded with the indurated chancre. An incubation of nine to twenty-one days; a slightly infiltrated base; little tendency to spread; resistance to ordinary (local) treatment; and persistence for from four to eight weeks; all this looks remarkably like chancre, or, at all events, like mixed infection. The last variety is the well-known phagedenic form of the disease.

TREATMENT, Robbins and Seabury admit, is unsatisfactory; as is evidenced by the great variety of measures advocated by different authorities. It is true that more than half the cases, severe and light, taken as they come, will heal in four to eight weeks under thorough cauterization with nitric acid, followed by rigid cleanliness and the use of calomel powder or black wash. But there are enough failures with this method to render it desirable to consider others. The authors especially recommend the following:

² PROGRESSIVE MEDICINE, 1912, p. 111.

³ Journal of American Medical Association, October 13, 1917.

A careful spirochete examination should be made in every case before any local treatment is undertaken; if local antiseptics have been used before the patient is seen, a distilled water wet dressing is applied for from fourteen to thirty-six hours, and then the microscopic examination made. Destruction of the infected lesion is then undertaken. A small pledget of cotton wet with a 10 to 20 per cent. cocaine solution is applied for five minutes; and then the field is carefully cleansed with soap and water and dried. Each lesion is then thoroughly swabbed with cotton on an applicator, and the subsequent oozing controlled by pressure. A 25 per cent. solution of copper sulphate is then applied to the sore, and the short, high-frequency spark from a rather fine-pointed vacuum electrode is applied directly to the sore from one to three minutes, depending on the extent of the ulceration. Especial care is exercised to carry the point of the electrode well down into any fissure or undermined edge; and the area of the application should extend over the edge of the sore about one-sixteenth inch. The current is not turned off until every crack and crevice has been thoroughly treated, and the surface of the sore has become dark greenish gray in color. It is then wiped dry, and the parts are dressed with an antiseptic powder or a wet dressing of 1 to 10,000 or 20,000 bichloride solution. The patient returns in two days; and, if the destruction of the infection has been successful, the wound will show a perfectly healthy granulating surface and will heal in a few days. If the sore does not look clean, the application above recommended is repeated; in fact, the cauterization is repeated as often as necessary until the chancroidal infection is entirely eliminated.

The authors emphasize the statement that in this, as in any other method of treatment, success depends on careful, thorough work. There is danger of too little cauterization rather than of too much. If the electrode is not carried to the bottom of every pocket and crevice of the ulcer, the surface will heal over, only to break out again larger and deeper than before. They claim practically 100 per cent. of successes for it when properly carried out.

I have not used this special method; but it is practically cauterization with the high-tension spark, and therefore does not differ essentially from my own. When the ulcer is superficial and open, I use the Paquelin cautery after preliminary local anesthesia; this can be done rapidly and practically painlessly. When it is deep, I use the galvanocautery as described elsewhere in this year's review. By employing a suitable holder and shaping the iridoplatinum wire as the lesion requires, every cranny and recess of the wound can be reached. I have long since given up the employment of chemical caustics in chancroid; neither nitric acid nor the acid nitrate of mercury is as manageable as the hot wire.

Chlorine Gas in Scabies. The introduction of poison gas as a means of warfare by German "Kultur" has naturally led to the inquiry as to the possibility of its employment for less barbarous ends; and various military investigators have used it in parasitic and other dermatoses. Clark and Raper⁴ exposed 74 cases of scabies to chlorine gas in a concen-

⁴ British Medical Journal, July 28, 1917.

tration of one to two parts of the gas by volume to 1000 parts of air, the service gas helmet being used as a protection. The exposures were of five minutes' duration, and were given on four or more successive days. The patients had a hot bath before their first treatment, and wore the ordinary hospital clothing. The officers among them were given a more intensive treatment, wearing a box respirator for protection; they were exposed for twenty minutes to an atmosphere containing two to three parts of chlorine per thousand. Underclothing, sleeping garments, gloves, etc., were also exposed to the gas for twenty minutes; and clean bed linen was ordered the first night. The gas was delivered from cylinders into a room of about 1000 cubic feet of air space; and it was found that, after a very little practice, it was easy to approximate the degree of gas concentration that was desired.

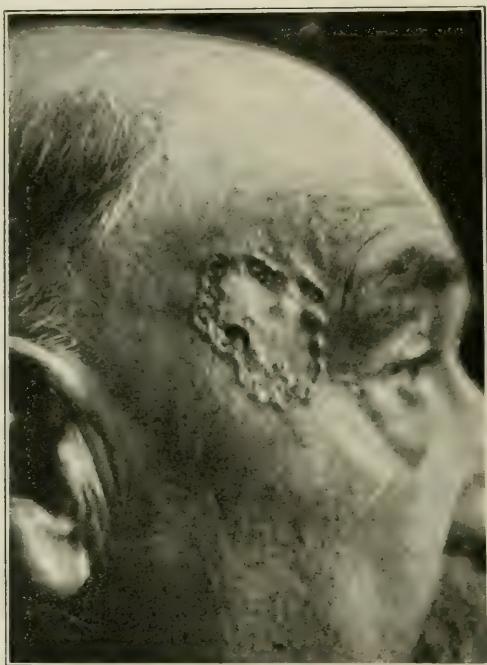


FIG. 14.—Epithelioma, superficial type. (Case of A. Ravogli.)

The results of the treatment on the whole were not satisfactory. Not more than 25 per cent. were cured, though improvement was noted in a much larger proportion. In a considerable number there was a marked eczematous reaction to the treatment, especially around the genitals, which required prolonged after-care. This cannot be said to be a satisfactory result in a malady so amenable to ordinary treatment as scabies; though note must be taken of the statement that some of these cases had been previously treated with sulphur in various forms for a long time and ineffectively. This is a strange result under the circumstances; for certainly in the camp hospitals the control of the patients and the

efficiency of the treatment must be assured. Scabies should be cured in a very few days at the most under such circumstances. Is it possible that some other parasitic or non-parasitic dermatosis was present? Or that



FIG. 15.—Fungoid and infiltrating carcinoma of the skin. (Case of A. Ravogli.)



FIG. 16.—Advanced carcinoma of the skin. (Case of A. Ravogli.)

some especially obstinate form of parasite was the cause? Certainly, the scabies that we see in civil practice is a readily curable disease.

Cancer of the Skin. Much attention has been devoted to this important topic in previous reviews;⁵ Ravogli's article⁶ is a useful summary of the latest ideas of dermatologists on the subject. I append three illustrations from his paper showing the more superficial rodent ulcer type of the disease and two more advanced and infiltrating cases (Figs. 14, 15 and 16).



FIG. 17.—Creeping eruption. (Case of Kirby-Smith.)

Creeping Eruption. This subject has not been described in these pages; some space can therefore be given to its consideration in connection with the very good case figured by Kirby-Smith (Fig. 17).

The rather curious malady was first described by Lee, and appears as pale pink, convoluted ridges, about one-sixth of an inch in diameter, traversing the skin, and apparently just under its surface. The line

⁵ PROGRESSIVE MEDICINE, September, 1911, p. 104; ibid., September, 1912, p. 108; ibid., September, 1917, p. 98.

⁶ The Serologic and Cutaneous Review, 1917, No. 10.

may be continuous or beaded; and occasionally vesicles form which may dry up into superficial crusts. The line extends from a fraction of an inch to several inches daily, and seems to grow more rapidly at night. In ordinary cases only one or two, or a few lines are seen; but, in some cases, as in the one here pictured, there are many lesions, so that an extensive eruption is formed. The affection is evidently parasitic, though there is still some doubt as to the exact organism occasioning it. Its geographical distribution is interesting. In the Northern States it is so rare that even dermatologists rarely see it. On the other hand, in the South and West, especially where there are large bodies of stagnant water and swamps, it is very common. In Jacksonville, Florida, Kirby-Smith⁷ has seen 210 cases in seven years. It is much more common in the rainy than in the dry season, and is not known in the mountainous regions; and there is almost always a history of exposure to swamp water, as by wading, etc.

The entomological facts as to the nature of the parasite are still unsettled. It is called "larva migrans;" both Hanson and Rulle believe that it is the larva of a fly of the *gastrophilus* order. The natives call the affection "ground itch;" but they evidently include a number of other superficial itching dermatoses under that designation. Ordinarily, the parasite enters the skin through an abrasion; but a lesion does not seem necessary always, and apparently it can enter through the opening of a sebaceous gland. One infection or hundreds may be present; and in the course of time the parasite may wander far and wide through the skin, and occasion a very severe reactive inflammatory dermatosis.

Sometimes, and especially when there is only one or a few parasites, there are no subjective symptoms; but when there are many and active larvæ the patients sometimes complain very much, saying that they can feel every turn in the boring motions of the organism. Where the epidermis is thick, as on the soles of the feet, the track is not destroyed by scratching; but where it is thinner, as on the arms, the papules and entire tracks are often laid open and may become infected; with the result of a multiform impetiginous and eczematoid eruption. The larvæ can seldom be obtained from the pustular lesions; the small erythematous or vesicular lesion at the end of a track is the place to look for them, and a high-power lens is necessary to see them. Kirby-Smith has not succeeded with an ordinary magnifying glass.

As regards treatment, Kirby-Smith shaves off the epidermis over the furrows and papules with the belly of a sharp bistoury, and then applies a mixture of equal parts of tincture of iodine and phenol. His next choice is to freeze the entire track with solid carbon dioxide. The use of actual caustics, injections into the tracks of chloroform, iodine, or formalin, has been of little use in his hands, especially in the case of children who do not submit quietly. Concomitant eczema or impetigo must be treated by the usual methods.

Dermatology and Industrial and Health Insurance. At first thought the relationship of occupations to dermatoses would seem to be very

⁷ Journal of the Florida Medical Association, October, 1917.

slight, but Alderson,⁸ in a recent article, calls attention to so many instances of it that the subject is certainly worthy of attention. Some dermatoses are distinctly occupational, and many others are claimed by the sufferer to come under that designation. Of the first class may be mentioned the dermatitis venenata occasioned by the irritating dust to which teak-wood workers are exposed, and that occasioned by dye-stuffs, photographic solutions, etc. The rice-growing industry that has recently developed in California has caused the appearance of a considerable number of cases of dermatitis; eczema and dysidrosis has increased in frequency in many occupations on account of the various inferior and new preparations that are used. On the other hand, malingers and even merely ignorant persons are prone to ascribe any skin eruption, even a luetic one, to some occupational cause. Sometimes the affection has really a double cause. A person with a tendency to seborrhea, eczema, or dermatitis will suffer from skin reactions to traumata incident to his occupation which other skins will bear unscathed. The differentiation of these cases is really a matter for the skilled dermatologist; and treatment also must be skilfully applied. As Alderson says, many patients come presenting claims for compensation on account of vocational disease who have had their disability unduly prolonged as the result of improper treatment. They may have used home remedies, or prescriptions from pseudodoctors; and maltreatment has converted a short and relatively benign process into a troublesome and disabling affection. It is too often forgotten that an inflammatory process of the skin requires, especially at first, the most soothing measures only; the tendency being to feel that if a 1 per cent. solution is good, a 20 per cent. solution must be better. These patients suffer from overtreatment or too strong treatment more often than that which is too weak.

Epidermolysis Bullosa. This rare affection, or rather abnormality, of the skin has been considered and figured in previous reviews;⁹ Ravagli¹⁰ reports a severe case. The eruption first appeared a few days after birth in the form of small bullæ on the skin of the head and body. The boy, when seen by Ravagli, was eleven years old, and the lesions had been continuously appearing during his whole life. The slightest injury to the skin occasioned their appearance; half an hour after the traumatism the skin turned red and a bulla appeared, containing clear straw-colored or blood-stained serum. So slight were the traumata required to bring out the eruption that there was practically a continuous series of lesions; older blebs would be healing, which took about a week, while new ones were appearing. The pigmentation left by this interminable succession of bullæ had resulted in an irregular pigmentation of the skin of the entire body. The boy was otherwise healthy; it is interesting to note, however, that while there was no absence of hair, as in cases reported by Wende and others, there was complete absence of the nails of the fingers and toes (Fig. 18).

In discussing the causation of the affection, Ravagli inclines to the

⁸ Journal of American Medical Association, January 12, 1918.

⁹ PROGRESSIVE MEDICINE, September, 1906, p. 108; September, 1911, p. 115.

¹⁰ Journal of American Medical Association, July 28, 1917.

belief in its neurotic origin. This is hardly satisfactory, more especially as a distinct congenital deficiency in elastin has been proved existent

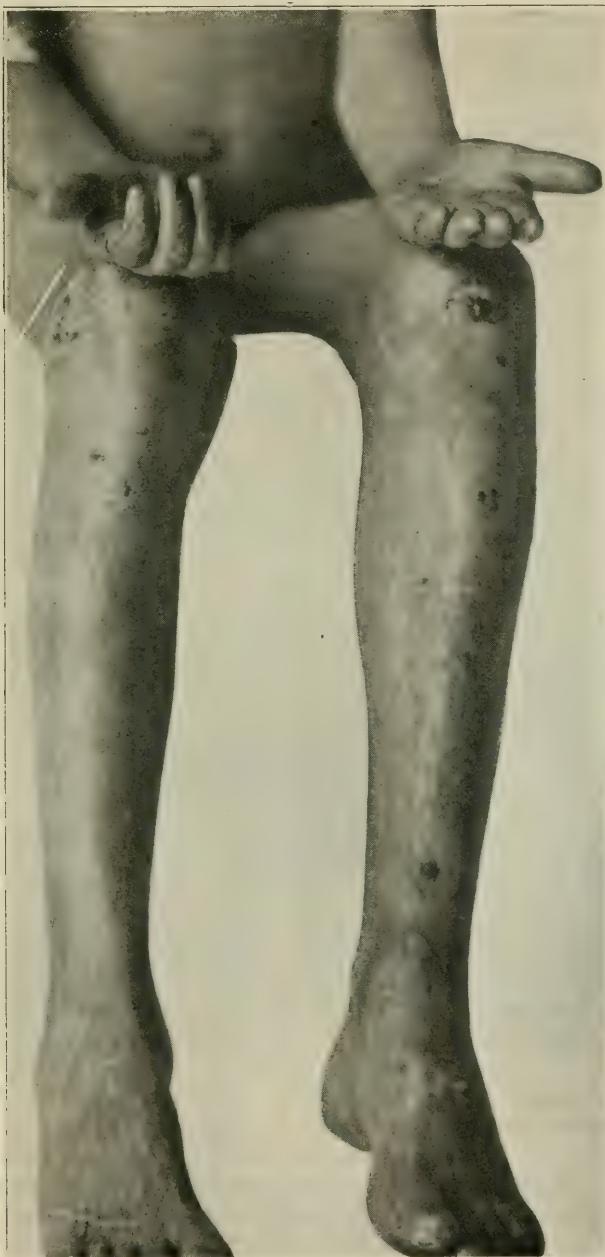


FIG. 18.—Epidermolysis bullosa. (Case of A. Ravagli.)

in a number of cases. Thus, Engman and Mook demonstrated¹¹ in several of their cases that the unaffected skin showed entire absence of elastic tissue in the papillary and subpapillary layers of the epidermis, and only sparse and deformed fibers in the deeper regions. The bullous lesions themselves and the tissue adjacent showed, in addition to the ordinary microscopic appearances and the edema, this same absence of elastic tissue. They did not find evidences of peri-arteritis and periphlebitis, as some observers have noted. We must therefore look upon these cases as instances of a congenital abnormality of the skin, combined possibly in some instances with excessive irritability of the vaso-motor nervous system.

Ravagli concludes that there are three etiological factors involved: (1) Heredity; (2) peculiar vulnerability of the skin; (3) disturbed stability of the vasomotor system. Nevertheless, he seems to hold that syphilis is in some way concerned with the appearance of the affection, and bases his treatment on that. He reports good results from the employment of mercury and arsenic in large doses.

Skin Manifestations in Hodgkin's Disease. Cole¹² states that about one-quarter of all cases of Hodgkin's disease show cutaneous manifestations; some authorities place their incidence at a less figure; but Cole believes that this is due to the fact that they are overshadowed by the other symptoms, and are often not looked for. According to Ziegler and to Westphal, in 10 to 15 per cent. of the cases the skin symptoms are the first manifestations of the disease. Intense pruritus, often accompanied by a prurigo-like exanthem, is the commonest manifestation; though urticarial eruptions, exfoliating erythrodermias, and pigmentation of the skin also occur. A classification of these eruptions, in the present state of our knowledge, does not seem possible; but Cole rightly says that in any case of suspicious, persistent pruritus, urticaria, prurigo-like exanthem, bronze pigmentation, etc., of unexplainable origin, Hodgkin's disease should be kept in mind, and suitable examination of blood and glands should be made. I append a picture of one of Cole's cases showing the infections and excoriations resulting in long-standing cases of the kind (Fig. 19).

Hyperhidrosis. This subject has not been discussed in these columns for a number of years,¹³ at which time I adverted to the radical suggestion of using the cautery in the obstinate cases not infrequently encountered. As the general practitioner is usually consulted in these cases, it may be useful to review our present knowledge of the subject. Unfortunately, the therapeutic side of the matter, which especially interests us, has little that is new to be noted. Sutton,¹⁴ in his elaborate study of a localized case, has little to say on this head. More recently the approved methods of treatment have been reviewed in the *Journal of the American Medical Association*, January 12, 1918. Sweat excretion, more than any other function of the integument, is under the imme-

¹¹ PROGRESSIVE MEDICINE, September, 1906, p. 109.

¹² Journal of American Medical Association, August 4, 1917.

¹³ PROGRESSIVE MEDICINE, June, 1902, p. 173.

¹⁴ Journal of Cutaneous Diseases, March, 1917.

diate control of the nervous system; as is evidenced by the immediate effect of psychic stimuli upon it. Thus, it is suddenly and largely increased by fear and other mental states, and may be inhibited by worry and similar emotions. Besides this, it is notably affected by disease of the internal organs, as is shown by the excessive perspiration of tuberculosis, and the deficient sweat excretion in kidney disease. Hence the



FIG. 19.—Hodgkin's disease. (Case of H. N. Cole.)

first rule of treatment in either general or localized hyperhidrosis is the care of the general health, both physical and psychic, and the treatment of any internal disease or abnormality that may be present.

Most cases that consult us, however, are ones that show no general abnormality of any importance; and while we may and should order hygienic measures, our main treatment must be local. The parts affected should be frequently and properly bathed, and should be kept as cool

as possible; and much attention should be paid to the clothing and shoes. All tight articles, and especially those composed of impenetrable materials, should be avoided. Impenetrable dress shields and rubber-soled shoes should be discarded; and especial care should be exercised to provide for the free evaporation of the fluid poured out on the surface of the skin. For it must not be forgotten that the sweat is a physiological excretion, and performs a useful function; and that excessive sweating is objectionable chiefly because it is uncomfortable. And it is not the sweat that evaporates that causes discomfort, but rather that which cannot be disposed of in the usual manner.

For the local treatment, Stillians¹⁵ has recently suggested the employment of a 25 per cent. solution of aluminium chloride in distilled water, to be dabbed gently on the parts every day and allowed to dry. He claims a rapid amelioration of the symptom under this treatment. Formalin, best used in the form of a 2 to 5 per cent. solution of the official liquor formaldehyde in water is an old and valued remedy; unfortunately, it is not infrequently irritating to the skin, and we do not improve the patient's condition when we superinduce an artificial eczema on the hyperhidrosis. Personally, I prefer potassium permanganate, from 0.5 to 1 per cent. in strength, to be applied once or twice daily. Of course, it stains the skin; this is no objection to its employment on the covered parts of the body, and on the uncovered parts a solution of oxalic acid can be cautiously used to remove the objectionable color. In obstinate cases, chromic acid, 2 to 5 per cent. in water, may be used; once a week is quite sufficient. This latter application must be employed with caution, since it is quite liable to set up a dermatitis. Less unpleasant, but also less efficacious, is tannic acid in 0.5 per cent. alcoholic solution, or as a dusting powder, salicylic acid, zinc stearate, and bismuth in powder, etc. The *x*-rays act remarkably well in some cases; in others, they fail. As always, in recommending this therapeutic agent, I couple a caution with the advice; it is easy to do great damage with it. I always use the Cornell contact tube in these cases; the dosage is small, and there is very little danger from its employment. In the very worst cases, as in those of obstinate and apparently causeless local pruritus, the actual cautery, the flat Paquelin blade, being lightly brushed over the surface, will give us results when nothing else will do so.

Intravenous Foreign Proteins or Autoserum in the Treatment of Psoriasis. In spite of the success, so far as removing the lesions is concerned, achieved by the autoserum injection method in this disease, the continued search for some other local or general remedy to cope with the phenomena of the disease shows that a method satisfactory in general use has not been obtained. My own experience with autoserum therapy during the past year is briefly noted elsewhere in this review. Perry¹⁶ has employed horse serum with moderately good results. Later, foreign proteins were used, typhoid vaccine being usually injected as the most

¹⁵ Journal of American Medical Association, December 30, 1917.

¹⁶ Boston Medical and Surgical Journal, 1916, p. 274.

readily available one of the group. Engman and McGarry¹⁷ report favorable results from its use, and recommend further trial. Scully¹⁸ therefore decided to try the method thoroughly in the dermatological wards of the Cook County Hospital.

Eight cases of chronic psoriasis were selected which were resistant to other therapeutic methods; chrysarobin, ichthyoil, and arsenic, internally, having been used without effect. The cases were all generalized ones of the guttate or nummular types, and the present attack had existed for from one to seventeen months. Four of the patients had had their skins cleared in past attacks by other methods; but, in the 4 others, the lesions had never entirely cleared up. All remained in the hospital during the entire period of treatment. The typhoid vaccine, as prepared from an active culture, grown for twenty-four hours on agar slants, washed off with saline solution, killed by heating to 70° C. for two hours, and preserved by the addition of 0.5 per cent. phenol. It was diluted so that each cubic centimeter contained 100,000,000 organisms. From three to five injections were given at intervals of three or four days. The average dose was 75,000,000 to 100,000,000, the same amount being used for the succeeding as for the initial injections. Following the third injection, 2 per cent. chrysarobin ointment was applied daily to the lesions on the body, and 5 per cent. ammoniated mercury ointment to the face and scalp. No internal medication was given.

A reaction followed the vaccine, as usual, but with little rise of temperature or leukocytosis; and these phenomena become less marked in the later injections. The maximum rise was to 103° F. and the maximum leukocytosis was 17,600. Headache was noted in 2 cases, and nausea and vomiting in 1 case. No other ill-effects were observed. Following the first one or two injections the lesions became less inflammatory and less indurated, without any notable retrogression; no new ones appeared, and scaling diminished. In 2 patients, who had previously been using chrysarobin, the lesions cleared up rapidly after the vaccines were administered. In the other patients there was little change in the eruption until after the application of the chrysarobin, following which the lesions disappeared completely in from eight to sixteen days. The dermatitis from the prolonged use of chrysarobin, Scully states, cleared up promptly after one injection of the vaccine. One patient who had been using chrysarobin previously had developed a marked dermatitis; after the first injection of the vaccine, the itching and erythema disappeared within twenty-four hours. Another patient who had received three injections of the vaccine and who was using chrysarobin ointment developed a mild dermatitis on the seventh day after the last injections; following the fourth injection, the dermatitis subsided rapidly. These observations and comments of the author on chrysarobin dermatitis I shall refer to later.

The author's comment on his results are to the effect that the vaccine had a favorable effect, especially in obstinate and chronic cases. It

¹⁷ Journal of American Medical Association, December 9, 1916.

¹⁸ Ibid., November 17, 1917.

was, however, entirely symptomatic, clearing up the existing lesions, but offering no hopes of permanent relief. The lesions yielded more readily to vaccines and chrysarobin than they did to chrysarobin alone; and some patients who had used the local drug for a long time without much result, reacted to it favorable as soon as the vaccine treatment was administered. His conclusions are as follows:

1. Intravenous vaccines alone do not clear up the lesions of psoriasis, though they do lessen the inflammation and the inflammatory reaction.
2. When used in conjunction with weak chrysarobin ointment, the lesions clear up rapidly.
3. Favorable results were obtained in chronic generalized cases resistant to other forms of treatment.
4. Chrysarobin dermatitis is prevented by the vaccine, and, when present, yields readily.
5. The action of the vaccine is not thoroughly understood, but it seems to lessen the sensitiveness of the skin to local medication, allowing uninterrupted treatment.

A comparison of this method of foreign proteid injection with that of autoserum is inevitable. Scully claims that the vaccines are easier of administration, but admits that they are followed by a more or less marked reaction, necessitating that the patient remain in bed for from eight to ten hours. This means at least a day in bed after each, which is a serious inconvenience. I have tried the typhoid vaccine injections in a number of cases at the City Hospital last year; in some instances the reactions were quite severe, with high temperatures that kept the patient in bed for a week. This, of course, is a matter for serious consideration in cases that are chronic, that can pursue their usual avocations, and that require, as most of them do, a series of injections. The author's statement that the autoserum injections require care and time will hardly be an objection to their use; and the danger of infection in giving them is not a consideration of weight with present-day methods.

The author's attitude as regards the inflammatory reaction excited by the local treatment is one with which I cannot agree. A local inflammatory reaction is necessary for the cure of the lesions; and the quicker that is attained, and the weaker the application with which it is gotten, the quicker and more radical the results. The reason why results are so slow and imperfect in many cases that have not had the autoserum treatment is just because the reaction is so slight and imperfect that there is little effect on the lesions. As a matter of fact the cases that do best, no matter how extensive, old, and indurated the skin lesions are, are those that after the autoserum course get up a vividly acute general dermatitis in a few hours with a very mild (1 or 2 per cent.) chrysarobin ointment; this subsides, with desquamation, in a day or two, leaving a chrysarobin stained general integument, with the site of the psoriasis lesions perfectly white and smooth. I must repeat the assertions made in former publications,¹⁹ since the added experience confirms them. The autoserum treatment increases the sensitiveness

¹⁹ PROGRESSIVE MEDICINE, September, 1916, p. 107.

of the lesions and the general skin so that very weak chrysarobin or chrysarobin and salicylic acid combinations occasion a vivid reaction; the immediate local therapeutic effect of the external remedies depends on the quickness and acuity of this reaction; and, finally, it seems probable that a sensitizing of the skin and lesions is occasioned both by the foreign protein and the autoserum injections.

Comparing the two methods of foreign proteid and autoserum injections, there is no doubt in my mind as to their comparative value. The foreign proteids may be a little easier for the physician to administer, but they are certainly more difficult for the patient to take. The reaction after the typhoid injections, while not serious, is a fairly constant phenomenon, and at times it is severe enough to confine the patient to bed for days. There is practically never any reaction after the autoserum injections; the patients get them in the office and at once go about their ordinary business. And the effects of the serum injections on the dermatoses are fairly uniform and constant. Without going into detail into considerations that have already been given in these pages, I may say that the injections are now a regular part of my office treatment of psoriasis, chronic generalized eczema and other scaly dermatoses; that under their use alone there is always a marked improvement in the eruption, less inflammation, swelling and scaling; and that I have yet to meet the first case in which a very few days of local treatment after the series of autoserum injections did not effect a very marked or an absolute disappearance of the eruption. On the basis of an experience of a number of years and many cases, I unhesitatingly recommend the autogenous serum injections rather than foreign protein injections in these affections.

Lepra. Denny, Chief of the Culion Leper Colony, has made a statistical study of the disease as at present existent in the Philippine Islands, based on the histories of 10,000 cases isolated in the Culion Leper Colony.²⁰ The investigation was an individual one, the facts as to race, nationality, birthplace, residences, marital relations, family history, etc., being obtained as completely as possible. The opinions of the patients themselves as to the probable source of their infection were not given serious consideration, since most of them have but little knowledge of any but the most elementary principles of hygiene and sanitation. Similar statistics have been collected for the Hawaiian lepers by McCoy.²¹

In over half the cases the first signs of the disease were noticed at the age of between sixteen and thirty-five years, the other half being noticed in about equal proportions between the ages of five and fifteen and over thirty-six in about equal proportion. Less than 1 per cent. of the cases record recognition of the disease before the age of five years. Twenty-nine per cent. of the cases segregated at Culion gave a definite history of contact with at least one leper relative, and this percentage, large as it is, is probably much too low, for it was not infrequent at the colony

²⁰ Journal of American Medical Association, December 29, 1917.

²¹ Public Health Bulletin, 1914, 66.

for a leper on admission to give a negative family contact history, and then months or years later to have a brother, sister, cousin, or other relative admitted as a leper. In nearly two-thirds of the cases, finally, leprosy in some relative was established.

The great majority of the cases were of the "nodular" or "tubercular" type, most of the remainder being "mixed" and only a small majority of the true "anesthetic" variety. The longest duration of the disease of which authentic record was found was forty-eight years, the woman affected being sixty-three years old, who has spent the last eight years at Culion. Regarding the fate of the children of leper parents no reliable statistics were available. Many of them had died of the various epidemic diseases prevalent in the islands, and the carelessness of the natives prevented the obtaining of any exact data.

Denny's conclusions are of interest:

1. One-half of the cases of leprosy under consideration were diagnosed at adolescence.
2. Twenty-nine per cent. of the lepers gave definite histories of contact with leper relatives. More efficient investigation would, in his opinion, reveal contact histories for all the lepers.
3. Thirty-five per cent. of those giving histories of contact with a single leper relative were sisters and brothers, 27 per cent. were cousins, while 11 per cent. were leper children and 7 per cent. were leper parents.
4. In the occurrence of infection of two or more relatives the majority of cases were among members of like sexes, the noteworthy exception being the number of mothers and sons infected in excess of the number of mothers and daughters.
5. Numerous records show multiple infection within families, spreading over one, two or three generations, more than half the infected persons being brothers and sisters.
6. In 1 per cent. of the lepers who were married before admission to Culion the infection was between husband and wife.
7. The male sex was more frequently infected.
8. The average duration of leprosy is 7.3 years.
9. Mortality among children born of leper parents is high. The incidence of infection among children living in the colony from one to ten years was 10.4 per cent.
10. Infection of children born of parents one of whom was a leper and living among lepers for from one to ten years was 44 per cent.
11. No facts as to the actual transmission of the disease were deducible from this study.

Leprosy Treatment. The only recent novelty in this field has been the intravenous injection of the sodium salts of the fatty acids of chaulmoogra oil; it is supposed to produce reactions in leprous tissues with breaking down of the acid-fast bacilli, which reactions are followed by great improvement. Rogers²² finds that subcutaneous injections do not produce reactions in the leprous tissues and are less effective than intravenous ones. Prolonged oral administration of the drug in quan-

²² Indian Journal of Medical Research, October, 1917.

tities of 20 grains and upward daily has a good effect, especially if intravenous injections have been previously given, and also in conjunction with them. Between one and two years were required to cause the lesions to disappear in the successful cases treated by Rogers, but he thinks that this period may possibly be reduced by the use of the more active higher melting-point preparations, which have only been under trial for the last six months. The lesions have disappeared in 50 per cent. of the cases treated within three years of the onset of the disease, including cases treated for only three to twelve months; but in cases of from three to fifteen years' duration only 25 per cent. of the cases cleared up under the treatment. The most active constituent of the oil has not yet been obtained in a pure state.

Rogers has now given over 1000 injections of the drug without any ill-effects save temporary giddiness and headache and occasional localized clotting in the veins, while the results have been most satisfactory. The sodium salts of the fatty acids derived from chalmoogra seeds are dissolved in water in a strength of 3 per cent., so that 2 c.c. contain 1 grain of the salts; this allows of the ready calculation of the dosage in either grains or fractions of a gram. The solution may be sterilized in an autoclave with phenol added, or it may be phenolized first and then heated in a water-bath to 100° C. for twenty minutes. At least 0.5 grain in 1 c.c. is the initial dose, and this is increased by 0.5 to 1 c.c. at a time until 2 to 2.5 grains in 4 or 5 c.c. is reached, provided that severe giddiness is not produced. The higher melting-point preparations are slightly less toxic than the lower ones. The injections are given once or twice a week; on the other days 2-grain pills or tablets of the drug are given by the mouth after meals, beginning with one three times a day and increasing by one daily until ten to twelve a day are taken, so long as digestion is not disturbed or giddiness produced. Some patients are able to take 40 grains in twenty pills daily with advantage. In most of the cases detailed only intravenous injections were given, so that good results can be gotten with the injections alone. This, Rogers points out, is important in leper asylums with strictly limited incomes. If there is anything of therapeutic value in this new method of treating this intractable disease it lies in the intravenous administration of the salts of the drug, for we have used chaulmoogra oil by the mouth for many years in the skin wards of the City Hospital of New York without any definite results.

Bercovitz,²³ writing from Hoi How, Hainan, China, has used chaulmoogra oil hypodermically according to Heiser's formula; chaulmoogra oil, 60 c.c.; camphorated oil, 60 c.c.; resorcin 4 grams. The mixture was sterilized and injected under the skin of the arms or legs. One c.c. of the mixture was the initial dose, repeated at weekly intervals. After three weeks the dose was gradually raised until 3 c.c. was injected each week. After the first injection there was a slight reaction in all the patients, but in no case did it exceed a slight headache, with malaise and a suggestion of nausea. No reactions occurred after the first injection,

²³ Journal of American Medical Association, June 30, 1917.

and weekly injections were continued for nine months. The mixture was readily absorbed and there were no local reactions; in one case there was a local infection which healed readily under appropriate treatment. No injections were made directly into the lesions; there was practically no other treatment.

The patient, 15 in number, were all in advanced stages of the disease, of the mixed anesthetic and tubercular type, and had had the malady for eleven years on the average; the most recent case was of four years' duration. Five of the series gave a family history of leprosy. All belonged to the lowest class of Chinamen, had always lived in filth and had partaken of the usual Chinese food, including a liberal allowance of salt fish. Yet within four weeks of the time that the injections were begun all the patients asserted that they felt more comfortable. The malaise and lack of energy that accompanies the affection had markedly decreased and the appetite and general condition were better. In the course of time all the local lesions began to show signs of improvement. Ulcers improved and in many cases healed over; nodules and tubercles disappeared, and even anesthetic areas were greatly improved. Microscopic examination of nodules in treated cases showed degeneration of the epithelioid cells with more or less marked fibromatosis; bacilli were always present. The picture was essentially that of a healing tuberculosis. Bercovitz summarizes his conclusions as follows:

1. The chaulmoogra oil formula used by Heiser is effective in the treatment of leprosy.
2. The hypodermic use of this formula is a satisfactory method of administering the drug.
3. The tubercular forms of leprosy respond to the treatment earlier than the anesthetic forms.
4. Anesthetic areas in both types of the disease have become hypersensitive, with improvement, and some patients have reported return of tactile sensibility.
5. Large ulcers have healed under the treatment, with the formation of clean white scars.
6. Sections from cases showing marked clinical improvement show fibrosis of the leprous nodules.

We have used the hypodermic method of chaulmoogra oil administration in the City Hospital here for some time past. The clinical results attained have certainly not been as striking as those recorded by Bercovitz. Nevertheless, in the absence of any other method of treatment promising results, and in view of the lack of efficacy of chaulmoogra oil taken by the mouth, we are keeping our patients upon the hypodermic formula.

A Microcautery for Use on the Skin. The cautery handles and points that are to be found in the instrument shops are entirely unsuited for dermatological work; the handles are large and clumsy and the points are entirely too long. They are designed for use in cavities, such as the nose and throat, and for rougher and larger work than we usually undertake. What we need is a small, conveniently shaped holder, that may be used like a pen, with the hand resting on the adjacent skin, and very

fine and small points that may be shaped in accordance with the needs of the individual case. Only with these means can rapidity and accuracy of application be ensured, matters of great importance when we remember that the face, and often the female face, is the part of the skin upon which we employ the cautery. Some years ago I devised a holder and points that fill our requirements, which was made for me by Wappler, of New York.

The handle is of hard rubber, shaped like a carpenter's pencil, four inches long and as light as it can be made. It is to be held and used like a pen, with the little finger and outer edge of the hand resting upon the surface of skin adjacent to that which is being treated; this ensures steadiness and accuracy of application. Under the forefinger is a small button, by pressure upon which the circuit is quickly made, the spring in the handle breaking the contact at once as soon as the pressure is released. This spring is very light, and if the contact points are kept clean mere pressure contact is all that is required to set the cautery working. There is necessarily a minute arc between the contacts each time the circuit is made or broken, and this leads to corrosion, no matter what metal is used; and the oxide thus formed are non-conductors and a frequent source of trouble. They are here made of platinum, which resists the corrosive action of the arc more than any other. They are so arranged that considerable lateral motion between the points may be made through the button, so that the opposing surfaces may be cleansed by rubbing; and there is, in addition, a fenestrum in the handle that permits of access to the points for the same purpose.

From the distal end of the handle project two short arms that hold the points, and from a half to one inch in size; they are bent so that their tips are in proper position and about 1 mm. apart. The arms end in small bulbous extensions containing orifices for the insertion of the points, and minute watchmaker's screws are seated in the bulbs to clamp the wires down. The orifices in the bulbs permit the use of iridoplatinum wire varying from Nos. 22 to 30, thus allowing quite a wide range in the size of the points that can be used. The tips of small and possibly discarded cautery points can be used in the holder, the long insulated portions being cut off, or points can be made of any desired shape and length from the wire itself. Thumb-screws, no matter how small, would be in the way, and a small watchmaker's screw-driver is all that is required to change the knives.

The conducting cords are attached to two stems at the other end of the holder. They should be lighter than those ordinarily employed, else they will drag on the handle and interfere with the accuracy of the application.

I have found this instrument extremely useful in a large number of skin conditions in which quick, limited and accurate destructive action is required, among which I may mention small epitheliomata, nevi, lupoid nodules, verrucae, sebaceous cysts and similar growths and excrescences (Fig. 20).

Primary Sarcoma of the Skin. That apparently insignificant skin lesions may occasionally be of the most serious import is a truth that is

sometimes brought home to us unpleasantly, of which the case reported by J. and E. P. Zeissler²⁴ is an example. The patient was a female, aged twenty-one years, who some ten months before had noticed a small, hard tumor on the skin below her lower lip. Four months before

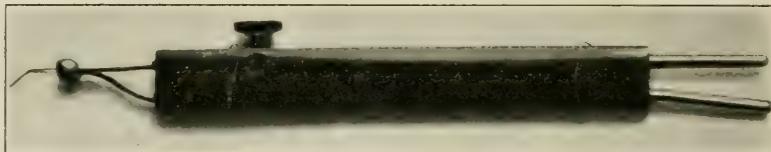


FIG. 20.—Dermatological microcautery. (Case of W. S. Gottheil.)

the pea-sized growth was removed by excision. A few weeks later regrowth began, and when seen by the authors there was a hard, bean-sized, xanthoma-like tumor present. It was widely excised again under local anesthesia, radium up to the point of a distinct local reaction being



FIG. 21.—Primary sarcoma of the skin. (Case of J. and E. P. Zeissler.)

employed afterward. There was smooth healing and a non-infiltrated scar. Microscopic examination showed the tumor to be a spindle-celled sarcoma of the non-pigmented variety (Fig. 21). Up to date, eighteen months later, the patient has remained well.

The Zeisslers draw the following conclusions from their case:

1. Primary spindle-celled sarcoma of the skin may exist for a considerable time as a localized lesion.

²⁴ Journal of American Medical Association, July 14, 1917.

2. Early excision will prevent the dissemination of a localized cutaneous spindle-celled sarcoma.
3. A primary non-pigmented sarcoma of the skin composed of spindle and giant cells is a rare type of cutaneous sarcoma.
4. The diagnosis of non-pigmented sarcoma cannot be made with certainty without microscopic examination.

SYPHILIS.

Extragenital Chancre. Though not very uncommon in dermatological experience, these lesions are always of interest; in previous issues of this review we have illustrated a number of cases.²⁵ Cole²⁶ has recently



FIG. 22.—Chancre of the nose. (Case of H. N. Cole.)

published a new series, of which we reproduce the following: Chancre of the nose (Fig. 22), with marked primary local adenopathy, differentiating it from a gumma; the ptosis shown in the patient is congenital;

²⁵ PROGRESSIVE MEDICINE, September, 1915, p. 126; ibid., 1914, p. 153; ibid., 1913, p. 133; ibid., 1909, p. 150; ibid., 1907, p. 127; ibid., 1905, p. 133.

²⁶ Journal of American Medical Association, December 17, 1916.

chancre of the nipple, with a generalized eruption (Fig. 23), and a chancre of the thumb in a girl, aged thirteen years (Fig. 24).

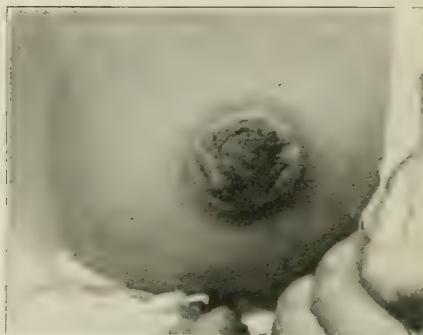


FIG. 23.—Chancre of the nipple. (Case of H. N. Cole.)



FIG. 24.—Chancre of the thumb. (Case of H. N. Cole.)

Bulkley has collected 9058 instances of authentic extragenital infection, 20 per cent. of which were upon the lips, 12.5 per cent. upon the breast, 5 per cent. upon the hands and the rest upon almost every conceivable part of the body. Some years ago I reported a series of cases in one family in which 9 members were infected, all extragenitally but 3. A girl, aged fourteen years, introduced the epidemic in the family with an ordinary genital infection. She infected two younger sisters accidentally, the initial lesions being on the cheek and the lips. Three other children were infected, all extragenitally; the youngest was a nursling. This baby infected the grandmother, who had a chancre of the forearm; she habitually carried the infant on the bare arm. Then the mother got an infection of the lip, and she infected the father of the family, whose chancre was penile. Thus the usual order in which these family epidemics of syphilis occur was reversed.

Arsphenamine (Salvarsan). Arsphenamine is the new official name for the various preparations of salvarsan now being made in this country, and it is well that we accustom ourselves to it as speedily as possible. As Stieglitz²⁷ says: One of the most important lesions taught us by the stoppage of importations of synthetic drugs as a result of the war is the fact that only a comparatively small proportion of those still protected by patents and introduced and widely advertised before the war have been found essential for the proper medical care of the people. And even of this small proportion only a very few have been in such urgent and widespread demand that manufacturers have been glad to undertake their preparation without feeling that they were entering upon the enterprise as a matter of patriotic service. Salvarsan, novocaine and veronal were the three really in demand, and the Committee of the National Research Council very properly decided to limit the licenses advised to be issued for the manufacture of these preparations to a comparatively few reliable houses. Before licenses were issued by the Federal Trade Commission the products were examined by the Public Health Service or the Chemical Laboratory of the Council on Pharmacy and Chemistry of the American Medical Association, and the Council further announces that it will continue to buy specimens of the authorized drugs in the open market, examine them and seek to protect the public against any falling off in the standards. And since the old names of these authorized synthetics had been trademarked and exploited commercially to the limit the names arsphenamine, procaine and barbital were substituted for salvarsan, novocaine and veronal respectively.

The official name arsphenamine is a contraction of the real name of the drug, arsenophenolaminehydrochloride. Manufacturing licenses have been issued to three bodies here, one of which is the Dermatological Research Laboratories of the Philadelphia Polyclinic, of which Dr. J. F. Schamberg is the director, and which, even before our entrance into the war, manufactured the arsenobenzol brand of arsphenamine. An importing license has been issued for the Canadian brand of arsphenamine, diarsenol, and one will be most likely issued for the importation of the French or Billon brand. A large supply is now being produced, and, although much of the product is still being taken by the Government for army and navy use, there should now be an abundance for general employment. The price to physicians has been fixed by the Government at \$1.50 per ampoule of 0.6 gm., and there is no reason why anyone should pay more. Physicians are urgently invited to report with full details any case of extortion or of inability to obtain moderate supplies, directly to the Federal Trade Commission in Washington. We are also informed that licenses for the production of neo-arsphenamine (neosalvarsan) are in preparation and will shortly be issued, the Public Health Service being engaged in drawing up standards for its purity.

THE CHOICE OF AN ARSPHENAMINE PREPARATION. There are now available here not less than five arsphenamine preparations, *viz.*, sal-

²⁷ Journal of American Medical Association, March 9 and February 23, 1918.

varsan prepared by the firm that has in the past controlled the importation of the German product, the product of the Takamine Laboratories, the Canadian Diarsenol, the French Billon brand and the arsenobenzol of the Philadelphia Research Laboratories. The choice is of importance, as what follows will show. I must state at the outset, however, that what I shall say is in no way based on personal experience. I chance to have had enough of the original salvarsan and neosalvarsan on hand at the outbreak of the war to supply all my needs since then, and I still have some left; I have therefore had no occasion to use the newer brands. What I shall say is based entirely on published reports and on information gotten from medical men who have used the drugs.

The reports on diarsenol, the Canadian arsphenamine, are only fairly satisfactory. Likes and Schoenrich say that the preparation in general is good, but Miller²⁸ records a death from uremia some four days after the giving of a 0.75 gm. dose of neodiarsenol. It is true that the drug was administered in a very small amount of water (15 c.c.), a method that I do not approve of, but there seems little doubt from the history that exitus was caused by the medication. E. P. Zeissler²⁹ calls attention to the insolubility of the preparation, stating that even after prolonged shaking there remain small undissolved particles, necessitating filtration. There was an unusually large percentage of reactions, nausea, vomiting, headache and fever for from twenty-four to forty-eight hours after the injection; in one instance there was collapse, and though the patient recovered, his condition was very alarming. In another very obese patient, for technical reasons, 0.6 of neodiarsenol was given intramuscularly; the pain and the local reaction were so intense as to require morphine injections for the next forty-eight hours. Zeissler has therefore abandoned the use of the preparation.

For the salvarsan brand of arsphenamine now made here by the former importers the reports are better; nevertheless, it does not seem to be as efficacious as the older preparation secured from abroad. Its effects on the earlier manifestations of the disease, whether on the skin or the mucous membranes, are not so brilliant. The secondary eruptions take several weeks and repeated injections before they disappear, and throat and vaginal mucous patches recede slowly. The effect is quite comparable to that obtained from mercurial treatment of the proper kind alone, and since mercury is always administered together with the arsenical treatment, it is not quite right to attribute results to the arsenic itself. The French "Billon" preparation has not, at this writing, been authorized for importation, nor is the product of the Takamine Laboratories yet available.

On the other hand, the arsenobenzol variety of arsphenamine prepared by the Philadelphia Dermatological Research Laboratories has given general satisfaction. It comes very close, at all events, to the original preparation in therapeutic efficacy; it does not seem to be more dangerous and, apart from some little difficulty in solubility, is not more troublesome to give. There is also an additional and very cogent reason for

²⁸ Journal of the American Medical Association, March 2, 1918.

²⁹ Ibid., December 29, 1917.

its employment here. At a time when there was no salvarsan of any kind obtainable here, Dr. Schamburg and the Philadelphia Laboratories jumped into the breach and did all in their power to supply the deficiency occasioned by the war and by our patent laws. The owners of the German patents did all they could, of course, to protect their monopoly, which had been a source of very great wealth to them. The process of making salvarsan was a secret one, and this, together with the facts that the medical profession and the medical and lay press all over the world had been skilfully inveigled into becoming advertizing agents for the remedy, accounted in large part for the opposition to it that was manifested in certain quarters. To quote from a daily paper of repute:³⁰ "The problem was so cunningly disguised in the descriptions set forth in the patents taken out in the United States that it took months to decipher them. . . . The drug named the "mother substance," a yellow powder, was itself patented. This powder must be mixed with a liquid which was also separately patented. Then there was a patent on the resulting product and the process by which the powder and the liquid were mixed. . . . The yellow powder must not be exposed to oxygen or it will volatilize with the rapidity of an explosion. It is necessary, therefore, to contain it in a glass ampoule, with one atmosphere of hydrogen. This container is patented. The remedy is introduced intravenously into the arm when it is converted into liquid. Even this method is patented. . . . Besides these interlocking patents issued to one or more persons the practice has been to use a trademark, and this has been taken out in the name of still another person not named in the patents. . . . Add to the intricacy of protection the further fact that purposely the Germans have withheld some one substance or process in producing the drug, and an idea may be had of the problems whith which the 'sleuths' of the American chemical laboratories have been confronted."

Under these circumstances I advise the employment of the arsenobenzol of the Philadelphia Laboratories in preference to the other arsphenamine preparations.

"FAKE" SALVARSAN. For a long time past it has been impossible to obtain this foreign drug, and salvarsan has been so extensively and astutely advertised that the impression prevails among medical men that syphilis cannot be effectively treated without it. Even the lay mind has been infected and the patients demand the drug, but, as is usually the case, under the impression that a single dose will eradicate the disease, as they were told by many hasty and ill-informed medical men some years ago. I have elsewhere combated the ideas in question at length. I recognize the usefulness of an intensive arsenical medication in the infection and employ it myself, but always in conjunction with and even subsidiary to the mercurial treatment, which is undoubtedly the essential thing. I shall only mention two facts in this connection: (1) That there is as yet no evidence to prove that with arsenic and mercury together we cure syphilis more surely than we have done

³⁰ New York Times, March 10, 1918.

in the past with the latter alone, and (2) that when, as happened several times in the syphilis wards of the City Hospital of New York during the past three years, there was no salvarsan at all for long periods of time, our therapeutic results were about the same, though in some cases less rapid than when it was freely available.

The demand for salvarsan throughout the country, however, is large. Congress has indeed very properly abrogated the patent rights and trademarks that enabled the German holders to sell millions of doses yearly of a drug costing only a few cents for several dollars a tube, and it is understood that the firm that had the monopoly here is now manufacturing the drug in this country. But the Government is absorbing much of it. It is not astonishing that unscrupulous persons have imitated the foreign product, and it is believed that quite a large amount of this useless and fraudulent product has been sold.

At the 1917 session of the American Medical Association, in New York, the Department of Health of the City of New York displayed specimens of imitation neosalvarsan, and the *Journal of the American Medical Association* at various times last fall gave details and pictures of the fraudulent containers and wrappings. In some cases the imitation of the foreign product was so close that minute points of difference similar to those relied upon by philatelists in detecting imitation from genuine postage stamps, were the only means of differentiation. Of course, physicians were readily imposed upon, but wholesale drug houses were also found to have bought large quantities of the "fake" drug for exportation. That the traffic was very large is shown by the fact that one individual alone was found to have ordered 50,000 aluminum containers in imitation of the genuine ones. The labels and circulars of information were reproduced photographically, the aluminum containers were exactly like those of the imported drug and even stamps for reproducing the embossed cap of the container were found.

The material contained in these "fake" containers was found in a number of cases examined to be common salt colored yellow. The entire cost, including containers, labels and all, could only have been from 5 to 10 cents apiece; yet they were sold to physicians at from \$5.50 to \$9 per tube, depending on the urgency shown by the purchaser. One drug house alone is known to have bought \$1800 worth. The illegal traffic has probably been going on since the drug first became scarce at the beginning of the war; and the chances are that very many doses of common salt have been administered to patients all over the country, with the idea that salvarsan was being used. It is my belief that a good deal of this stuff is still being hawked around in various surreptitious ways; for every once in a while I hear of some "real salvarsan"—that came over on the "Deutschland," the so-called "commercial" submarine that honored us with a visit a year or two ago, and which can be purchased cheap.

Under these circumstances it is almost impossible for the practitioner to be sure of the drug that he is purchasing if it purports to be "salvarsan," and my advice is to avoid all such entirely. On the other hand, however, there are several similar preparations now on the market that

are made here, one of which I recommend especially, and details concerning which are to be found under Arsphenamine (p. 119). This can be used with confidence, since its manufacture is authorized by the Government, and it is placed on the market under auspices that are entirely trustworthy.

Syphilis and Marriage. It goes without saying that luetics not indubitably safe, so far as partner infection is concerned, should not marry, except in the rare instances in which the proposed partner is already infected. The difficulty, of course, lies in the determination as to when the period of danger is past, for there does come a time in every case, treated or untreated, when neither the physician nor the community is justified in opposing what is, for the immense majority of mankind, at all events, the normal sexual life. It was my practice in the past to advocate a rule based merely upon the experience that after the lapse of a certain time, and especially when, in addition to that lapse of time, appropriate treatment had been carried out, the patient, though he might suffer from the after-effects of the disease himself, could not infect his partner and would not procreate syphilitic children. My rule was that when the infection was more than four years old, when the disease had been properly treated for three years, and when a year had passed without treatment and without symptoms, the patient could marry. Time enough has elapsed to enable me to pass a personal judgment as to the correctness of this stand-point from the practical side; and I can say positively that I have not had occasion to regret this rule or to change its terms.

The customary blood examination in syphilis has helped us a little in determining our attitude in these cases, but it leaves us in the lurch in the very cases in which we most need its aid. Of course, when a syphilitic, after proper treatment has a blood that is consistently negative to a number of widely separated Wassermann examinations, and when there have been no symptoms of disease for a long time, we can give him permission to marry with a quiet conscience. But, unfortunately, this is not the result usually attained. But few cases of syphilis are under expert treatment from the inception of the disease; most of our cases are late secondary or tertiary ones. And in most instances the results of our treatment are not essentially different from those attained under the older methods; active symptoms stop appearing after a time; but the blood remains permanently or temporarily positive to a varying degree. And this condition persists, so far as we know, for life. In the great majority of cases our means of judging whether a patient should be allowed to marry is therefore not improved by having the Wassermann test; in fact, I am afraid that the contrary is the case. I know of more than a few cases, as we all do, in which patients who have been carefully treated for their infection and presumably cured, and often happily married and with healthy children, have been made miserable for life by the information that they had a positive blood. Inasmuch as we can hardly hope to change this condition, and the patient practically takes his chance exactly as he did before we knew the test, the natural comment to make is, What is the use?

In view of these things our attitude as to the marriage of syphilitics must be exactly the same that it has been in the past; the new methods of treatment and diagnosis have made no difference at all. We are not justified in forbidding marriage to an individual merely because his blood is not Wassermann-negative, for to do so would debar a large fraction of the community from marriage, almost all of them individuals who are exposing no one, neither partner nor offspring, to any special risks, and who are personally as well and socially better off married than single. The old criteria as to a marriage license from medical hands remain just as they were; proper treatment for an adequate length of time and freedom from infective symptoms for a subsequent period.

These considerations are of interest at a time when the States are taking a hand in supervising this marital permission; many of them having passed laws with regard to it. Unfortunately, they all group syphilis, chancroid, and gonorrhea together as the "venereal diseases," so that maladies of very differing contagiousness and danger at various stages are legislated for together. Thus a man with a still positive blood is still syphilitic, though his disease may be a generation old and entirely innocuous so far as his partner and descendants are concerned. In the "Public Health Reports" of January, 1918, there is a useful resumé of the measures passed by the different States;³¹ it is presumably correct, though there is a mistake as regards New York City to which I shall call attention.

In New York, a person contemplating marriage must go before a town or city clerk and swear that he has not been infected with any venereal disease, or if he has been so infected within five years, that he has had a laboratory test within that period showing him to be free from any such disease. In New York City cases of venereal disease must be reported to the Board of Health. (This is not quite in accordance with the facts. In the attempted exercise of the indefinite and very extensive powers that the Charter of the Greater City apparently gives the Board of Health, this latter has attempted to secure voluntary notification of venereal disease by the profession; but the requests have not been complied with. The Board does inspect the records of public institutions where the name and addresses of patients are recorded; but private physicians do not, so far as I am aware, report their cases. It is regarded as an unconstitutional violation of the right of professional secrecy; and the Health authorities have not attempted to make it mandatory.)

In New Jersey, persons knowing themselves to be diseased, who marry, are guilty of a misdemeanor.

In Ohio, physicians are allowed to inform the other party contemplating marriage that the first party is infected with the disease. Cases must be reported, though as yet this order is not strictly enforced. In Chicago, notification must be within three days, and the patient must be given a circular of information regarding his trouble.

In Oregon, before a marriage license is issued, the male party must bring a sworn statement from a physician showing that he is free from infectious venereal disease.

³¹ Cleveland Medical Journal, March, 1918.

In Vermont, a person having been told by a physician that he was infected, and marries without the assurance and certificate that he is now free from infection, is liable to a fine of \$500 or imprisonment for two years. Cases must be reported.

In Wisconsin, all male persons within fifteen days before application for a marriage license, must be examined by a physician as to the existence of venereal disease by recognized clinical and laboratory tests. Cases in general must be reported; and, while such reports must be kept secret, public clerks who fail to file them are liable to a fine of \$100, and any physician making a false statement shall be fined not more than \$100 or imprisoned for six months, or both.

In California, the physician is fined \$500 or imprisoned, or both, for not reporting a case and also the source of infection.

In Iowa, North Carolina, and Philadelphia all cases must be reported, though the law is not stringently enforced; and, in Kansas, the patient in addition is given a number which corresponds with a serial number on the circular of information which is furnished him by the State; the object of this is not clear.

These are merely examples of what some communities are doing along these lines. It is eminently desirable, of course, that heavy penalties be imposed on individuals who knowingly, or even ignorantly, contract marriage while in the infectious stages of these diseases; but how to do that without violating the professional reticence that is a necessary element in the successful handling of these cases is still unsettled. Personally, I favor examination and a medical certificate as a prerequisite to issuance of the marriage license, with efficient penalties to guard it. To the notification and registration of syphilitics in general, however, I am entirely opposed.

The Prophylaxis of Neurosyphilis. It can safely be said that no one phase of the ever-present and eternally interesting problem of how to handle our syphilitic patients has excited as much interest and evoked as much discussion during the past year as this one. A radical difference of opinion has developed among the experts as to the duty of the practitioner in this matter; and, when the specialists disagree, it is difficult for the man who only occasionally handles a case to make up his mind as to the course to be pursued. To put the matter in its simplest terms: There are syphilographers who hold that the grave neural sequelæ of syphilis are sufficiently common to justify the most radical treatment at the very beginning of the disease in view of their possible advent, and that the severe methods of treatment recommended with that end in view are sufficiently successful to render their employment obligatory: And there are others who hold that these neural sequelæ are not sufficiently frequent to justify the general employment of this therapy, and the results of treatment are not of such indubitable benefit to the patient as to require us to subject all patients to it. According to one set of authorities, every syphilitic should be subjected to intraspinous treatment at the very outset of the disease, with the view of preventing cerebrospinal affections in the future, and the treatment is effective in doing this; according to the other set of authorities, such

treatment is unnecessary and impracticable, and, moreover, does not attain the end in view. No argument is needed as to the practical importance of a decision on this matter; for, if the views of the proponents of these measures is accepted, we are by no means doing our duty in the care of these cases under our present methods; we must entirely recast these latter, and subject our patients in all cases to the pains and penalties of intraspinal medication in addition to that ordinarily employed. Of the multitude of articles that have appeared, I shall select only a few of the more important ones.

For a number of years past the intraspinal method of treating the neurological affections and their sequelæ that are occasioned by the syphilitic infection has been developed with praiseworthy assiduity by a number of investigators, among others by Fordyce, Swift, and Ellis. A critique of their results in chronic aortitis, tabes, paresis, and cerebro-spinal syphilis is hardly in place here; suffice it to say that they cannot be said to have been conclusive. The reports have varied. Nevertheless the general opinion, both with syphilographers and neurologists, has been to the effect that in maladies otherwise so intractable and hopeless, any method of treatment that affords hope, even of amelioration, is worth trying vigorously. It is doubtless now used in very many of these cases. It is an entirely different proposition, however, to make intraspinal antiluetic treatment a part of the routine method of handling the disease, and, with a view of prophylaxis, to subject all our syphilites to it at the very outset of the disease.

A recent article by Sachs³² well represents one side of the question, and will serve me as text. On the basis of a very extensive neurological experience he states that he was one of the earliest victims of the fascinating belief that there was a prospect of striking at the very root of serious disease of the brain and spinal cord by injecting the remedy into the spinal canal; but that later experience had convinced him, as well as his associates, Strauss and Kaliski, that the hopes placed on this intraspinal method were unwarranted, and that it has achieved nothing that cannot be obtained by the intravenous method. He and his co-workers have demonstrated that the older doctrine that the choroid plexus is impermeable, and that salvarsan introduced intravenously cannot be expected to reach the cerebral or spinal tissues is untenable; it appears in the cerebrospinal fluid in appreciable amounts under these circumstances. Sachs then quotes Halliburton with approval to the effect that the use of salvarsan in locomotor ataxia and similar late syphilitic affections, *via* the cerebrospinal fluid, has been abandoned, as it is fatal not only to the syphilitic organism but also to the patient.

Sachs states that in many particulars the advantages of the intraspinal method have been greatly exaggerated, and the impression has been fostered among the laity that general paresis can now be cured, and by the intraspinal method alone; and this on the basis of laboratory findings, changes in the Wassermann reaction, reduction in the cell count in the cerebrospinal fluid, or change in the globulin reaction. These

³² Journal of American Medical Association, September 1, 1917.

may undoubtedly occur; but two considerations must not be lost sight of. In the first place precisely similar changes can be effected by intravenous medication pure and simple. And, in the second place, laboratory results are entirely of secondary importance in the treatment of these diseases, and clinical facts must be cautiously estimated even by the trained observer. Remissions in general paresis and improvement in tabes dorsalis means but little, and occur under many conditions and with many plans of treatment or under no treatment at all. The author therefore advocates the plan that antiluetic medication, if used at all, be by the intravenous method, which has given him quite as good or as bad results as the intraspinal.

It is interesting to note Sachs's general results with salvarsan in these cases. The best effects were seen in cases of cerebrospinal syphilis, where the immediate results were often striking. In the spastic forms of spinal paralysis, while the laboratory results were good, improvement has been rare and cure has never occurred. The same holds true of tabes, though in many instances the vesical symptoms, the sexual impotence, the lightning pains, and even the gastric crises, have disappeared under the intravenous treatment. In a large number of cases, however, it has had no influence at all. In general paresis the most that Sachs can say is that the salvarsan treatment has in some instances retarded the rapid progress of the disease; in no instance has it affected a cure.

Hammond, Sharpe, and Smith³³ have gone a step further, injecting the salvarsan into the lateral ventricles. As this is a procedure, however, that can hardly be regarded as within the domain of ordinary treatment of paresis, brief mention only will be made of it. Their attention was directed to the changes of the blood serum, the cerebral and spinal fluids of their patients; and their final report is that even the laboratory findings were *nil* or so slight as to be negligible in most cases. They say nothing of clinical results.

An entirely opposite view is maintained by Fordyce.³⁴ He summarizes his results in brief, as follows:

1. In tabes, certain types of cerebrospinal syphilis, like meningitis, meningo-myelitis, meningo-encephalitis, and in optic atrophy with positive findings in the fluid, intraspinal treatment succeeds in relieving or curing the conditions after failure of intravenous or other treatment.
2. It is the only treatment that can be employed after the intravenous treatment fails, or when the patient develops an intolerance to arsenic.
3. With proper technic and experience, it is less dangerous than intensive intravenous treatment.
4. In paresis with stigmata of degeneration, the most to be hoped for is temporary arrest of the encephalitis. There are border-line cases of meningo-encephalitis which simulate paresis and which are curable by the treatment in question.

Fordyce's other conclusions are, in the main, criticisms of the methods of opponents of the intraspinal medication, and do not here interest us. He ends, however, with the positive statement that "The future of the

³³ Journal of American Medical Association, July 7, 1917.

³⁴ Ibid., November 3, 1917.

syphilitic individual and the hope of anticipating or arresting the incurable degeneration is largely dependent on early and systematic examination of the spinal fluid."

From this stand-point to that of Fordyce's assistant, Rosen, is but a step.³⁵ Rosen advocates, as a routine method, regular and repeated examinations of the cerebrospinal fluid in every case of syphilis, and immediate intraspinal as well as intravenous treatment as soon as the tests show a strongly positive fluid. He even goes so far as to say that no clinic should treat syphilis at all unless it is prepared to treat cases of syphilis in this way. Swift³⁶ admits that intraspinal injections are not advisable in all cases, and that not infrequently general treatment alone is sufficient. But when general treatment is shown to be but moderately satisfactory, the addition of intraspinal injections is often of decided value. Corbus³⁷ claims that the ideal method of prophylaxis of cerebrospinal syphilis consists in attacking the disease in the primary stage, and that, if a correct diagnosis is made, and energetic treatment instituted at that period, there should be no further signs of the infection, and subarachnoid involvement would be unheard of. Lumbar puncture, with negative spinal fluid findings, is demanded in every case as final evidence of cure, no matter how energetically the treatment has been carried out; it is also demanded in every patient who presents himself for treatment after the primary period. Stated briefly, the proposition that is before us is this: Every syphilitic, even in the earliest stages of the disease, should have repeated lumbar punctures and spinal fluid examinations; he should have intraspinal treatment as soon as any changes from the normal are detected in his spinal fluid; and he should even have intraspinal treatment in any case in order to obviate possible spinal syphilis. In other words, every syphilitic should have intraspinal treatment. Obviously, this is a large order; and we must inquire (1) Is it needed? (2) Is it effective? and (3) Is it practicable?

It is necessary if cerebrospinal involvement is a frequent sequel to the syphilitic infection. Corbus concludes that some 30 per cent. of all syphilites show *serological* signs of cerebrospinal involvement; clinically, however, the proportion must be very much smaller. I do not know of any reliable statistics as to how many of those infected with syphilis ultimately develop cerebrospinal syphilis; but it is certainly small. Many of us have treated the disease for years; we have kept track of our patients for long periods of time, have seen them grow up and get old, marry and have healthy families, and live on or die of other things. Of course, it may be objected that the neurologists, and not the syphilographers, see the cases in question; but it is not the neurologists who advocate the early intraspinal treatment of the disease. Nor do I doubt the accuracy of the serological findings in these early cases; in fact, I think they are under- rather than overstated. Intense cephalgia is a regular symptom of the infection, and distinct nerve involvement is not rare; and this means involvement of the nervous system.

³⁵ New York Medical Journal, November 24, 1917.

³⁶ American Journal of Syphilis, July 1, 1917.

³⁷ Journal of American Medical Association, December 22, 1917.

But these phenomena, like the others, respond quickly to the ordinary treatment; and we have no reason to believe that, as is the case with any of the ordinary phenomena of earlier syphilis, recession of the symptoms does not mean obviation, so far as we can obviate it, of later deleterious effects on the organ involved. When we add to this argument the fact that many neurologists, who see both early and late instances of syphilitic nerve involvement, claim that exactly the same clinical results, or absence of results, can be obtained from the ordinary intravenous as from the intraspinal treatment, the conclusion is as inevitable that intraspinal examinations are not especially useful in early syphilis and that intraspinal treatment, whether there are serological changes in the spinal fluid or not, is not absolutely needed.

As to the *effectiveness of the intraspinal treatment*, opinions differ. My own experience, however, leads me to pronounce against it. Betterments and remissions in diseases like tabes and paresis mean little; they occur under all forms of treatment and under no effective treatment at all. The experience of neurologists, of course, would be conclusive as to this phase of the question; and their judgment, in general, has been adverse to the efficiency of the treatment. Of course, it can be urged that they usually see advanced cases in which serious organic change in the nervous tissues has already occurred.

Finally, there is the question of practicability. If the spinal examination and treatment advocated were easy and innocuous from the patients' view-point, much of this argument would lose its force. Spinal puncture, and especially intraspinal treatment, is practically an operative procedure; it necessitates rest in bed for at least a day, and usually more than that; and every patient will tell you that he regards the procedure seriously. I have lately had an example in the person of a physician of my acquaintance, who, for a syphilis of unknown origin undoubtedly acquired many years ago, submitted, in addition to the ordinary treatment, to six intraspinal treatments. Each one of them kept him in the hospital and in bed for three days or more, and so disabled him that he could not attend to his professional work properly for at least ten days thereafter. Incidentally, it may be stated that the treatment had no effect on the serological findings either in his blood or in his spinal fluid. We all know how difficult it is to keep our syphilitics to an ordinary course of treatment; how hard it is to persuade a young man who feels well and is apparently sound that he needs severe and continuous medication. Is there any chance at all of persuading the average case to undergo the intraspinal examinations and treatment? In my opinion it is perfectly hopeless; and when, in addition, we are not yet convinced of its necessity, usefulness, and efficacy, the verdict must necessarily be against it. I do not believe that, as things stand at present, there is any obligation on the physician to insist on spinal fluid examinations or intraspinal treatment in the ordinary case of syphilis. There are exceptional instances, of course, in which the patient is desirous of doing anything, and submitting to anything, that offers even a remote chance of favorably affecting his infection; but, for the average case, and as a routine method, I consider it out of the question.

OBSTETRICS.

BY EDWARD P. DAVIS, M.D.

The Relation of the Glands of Internal Secretion to Obstetrics. Perhaps the most important event, medically speaking, in the obstetric work of the past year and a half was the symposium¹ on this subject by the American Gynecological Society.

The importance of this subject in obstetrics may be understood from the following considerations:

That a relation exists between the activity of the *thyroid gland* and the uterus and mammary glands has been frequently observed. That the toxemia of pregnancy may be influenced by this activity has also been noted. The hope has naturally arisen that a better understanding of these conditions might result in greater success in preventing or controlling the toxemia of pregnancy and eclampsia. To some extent this hope has been realized.

The action of *pituitrin* upon the uterus is a matter of familiar observation, but the true value of lutein, adrenalin, and other extracts of ductless glands has not yet been proved. If, however, we are to advance in our knowledge of the essential processes of nutrition in mother and child, it must be by the study of the conditions which underlie processes of nutrition. Hence the importance of a review of our knowledge to ascertain what is definitely known and what can be depended upon in the management of patients.

Frank, of New York, in May, 1914, reviewed this subject before the American Gynecological Society, and he opened the present symposium with a review in general of this topic.

He called attention to the fact that the maternal sex glands are not indispensable to the fetus after the fertilized ovum is firmly attached in the uterus. This has been repeatedly proved by the birth of perfect children born of mothers from whom the ovaries had been removed early in pregnancy. Some of the maternal glands undoubtedly influence the development of the child, for we note abnormalities in the fetus when the mother has suffered from diabetes, hyperthyroidism, and tetany. It must also be remembered that at least some of the glands of internal secretion begin to exercise their function early in fetal life.

It is a matter of familiar observation that, immediately after birth, the sex organs and breasts of both male and female children may show activity. Thus, there may be uterine bleeding from the female child, and colostrum in the breasts and swelling of the breasts in both male and female infants. This peculiar stimulation has been ascribed to substances derived from the maternal placenta.

¹ Surgery, Gynecology and Obstetrics, September, 1917.

It is well known that the sex glands produce a decided influence in development and that the removal of these glands from children is followed by a lack of normal development.

Pregnancy produces a profound effect upon the glands of internal secretion; the hypophysis is most affected by pregnancy. The adrenal, thyroid, parathyroid, and pancreas are also much influenced.

We know practically nothing about changes in the glands of internal secretion accompanying the menopause, but analogy would suggest that such changes must occur.

In patients in whom the glands of internal secretion act abnormally, there is no evidence that any of these, except the ovaries, can exert a direct influence upon the genital tract. The symptoms, however, in these conditions are those produced by stimulation or depression of ovarian function. Anatomical changes in the ovaries have not been demonstrated.

Variations in the function of the glands of internal secretion are naturally divided into deficient activity and excessive activity.

When there is deficient activity the skeleton develops poorly; the nervous system is deficient; there is failure of function as in lactation atrophy, sterility and in disordered menstruation. There are other more remote results, as in goitre, myxedema, and acromegaly.

When function is excessive, there is unusual hemorrhage at menstruation, and at other times from the uterus. There is some evidence that fibroid tumors of the uterus are thus caused.

At present an accurate diagnosis of these conditions is rarely made. Under the head of sterility, dysmenorrhea, neurasthenia, retroflexion, and hemorrhage these cases are abundant in clinics, but not accurately classified, studied or relieved. There must be concerted work by the pathologist, the pharmacologist and biological chemist before accurate and efficient work can be done.

Frank is conservative in stating the results of organotherapy. He remarks that Kendall has announced a discovery of the active principle of the thyroid gland in crystalline form. Its method of preparation has not yet been published nor have the reports on its physiological activity been clearly given.

Frank states that the corpus luteum extracts commonly used are commercial products. He has examined many of these, finding them inactive biologically, and is skeptical concerning their efficiency.

He states that the sole organotherapeutic preparation which can be relied upon is thyroid extract. Its use, however, is still largely empirical.

Both *pituitrin* and *adrenalin* exert purely local drug effects, and do not replace the functional activities of the glands from which they are derived. Their scope is very limited. Extracts of other glands now obtainable, and as used at present, produce little or no effect.

If the *hormone* theory, as accepted at present, is to be practically applied, the vital principle of some of the glands of internal secretion must first be isolated and the proper dosage and method of using them must be discovered. The most important of these glands are the anterior lobe of the pituitary body, the parathyroids, the adrenal cortex and pan-

creas. The thyroid, thymus, pineal, ovary and testis are not essential for the continuance of life, although their secretions are of importance in the body.

The test which Frank proposes clinically in this matter is that any of these substances, to be efficient and accepted, must lend itself to standardization and be demonstrated by biological tests.

THE RELATION OF THE PITUITARY GLAND TO THE FEMALE GENERATIVE ORGANS. Goetsch² contributes an illustrated and interesting paper upon this subject, with a review of the literature.

Reviewing the histology of the pituitary gland, he calls attention to the fact that the pars intermedia which invests the posterior lobe is composed of several layers of undifferentiated cells without bloodvessels or connective-tissue stroma. These cells elaborate a kind of colloid secretion which is thought by some to find its way through the meshes of the posterior lobe into the third ventricle of the brain. It is probably this colloid material which carries the active principle of these cells often called pituitrin. The cells of the anterior lobe without doubt discharge their secretion directly into the large blood and lymph sinuses which are so numerous here and with which the cells are in such intimate contact.

By experiment it has been shown that partial removal of the pituitary anterior lobe in dogs was followed by secondary hypoplasia of the organs of generation in adults or by a persistence of sexual infantilism in case the operation was done on puppies.

If the operation had been so conducted as to create a subsequent and permanent inefficiency of posterior lobe secretion, the temporary lowering of the assimilation limit is succeeded by an abnormal and enduring augmentation in the tolerance for sugars.

The assimilation limit for carbohydrates greatly increased under these circumstances can be promptly lowered by the coincident intravenous or subcutaneous injection of posterior lobe extract. This extract, furthermore, has a pronounced effect in lowering sugar tolerance in the normal animal, in whom it may even cause glycosuria when given in sufficient dosage.

Regarding the posterior lobe, it has been found that there exists a relation between its secretion and the secretion of milk both during and after pregnancy. Whether this action of posterior lobe principle is one specifically stimulating to the mammary cells or whether it produces its effect by causing contraction of the smooth muscle fibers around the ducts of the gland, thus causing the expression of milk, remains an open question.

The fact that extract of the anterior lobe of the pituitary body stimulates the organs of reproduction was demonstrated by experiments upon rats. These animals reproduced their kind much earlier and oftener when fed with this extract than under other conditions, and this effect persisted throughout the adult life of the animal.

When there is excessive secretion and action of the pituitary body in

² Surgery, Gynecology and Obstetrics, September, 1917.

animals, at autopsy atrophy is found in the final stage in the reproductive organs. Thus in gigantism and acromegaly we have overgrowth of the skeleton, with lack of development in the genital organs.

During pregnancy the hypophysis increases, due to hyperplasia and hypertrophy of the anterior lobe. This results from the accumulation in large numbers of a new cell type called the pregnancy cell, derived from the chief cell. These large pregnancy cells, which are clear and neutrophyllic, crowd aside and into the more central portion of the gland acini. The hypertrophy occurring in the latest stage of pregnancy may become so marked as to exert pressure upon the adjoining optic chiasm sufficient to cause a transient bitemporal hemianopsia. There may also be signs and symptoms of a temporary hyperfunction of the pituitary, such as changes in the thickness of the nose and face and enlargement of the hands and feet. There may also be a transient glycosuria. Within a few months after the birth of the child retrogressive changes occur, the pregnancy cells return to the type of chief cells and the gland once more assumes its normal appearance. After repeated pregnancies the gland may not undergo complete involution, and there may develop a strumous degeneration, followed by symptoms dependent on a deficiency in pituitary secretion.

After the sexual organs are removed the pituitary body is enlarged, and characteristic increase in weight has been often observed.

Pituitary extract is used to cause the uterus to contract and also to produce contraction of the smooth muscle fibers in the wall of the intestine. The preparation commonly sold is an extract, called *pituitrin liquid* or *pituitrin*. This is a carefully prepared solution of the active principle of the posterior lobe and can be standardized by the isolated uterus method. The active principle of the pituitary posterior lobe is put up in normal salt solution, each ampoule containing 1 c.c. The active principle of the gland can readily be extracted from the fresh glands by water and also by alcohol. The extract made with acidulated methyl alcohol is more than twice as strong as the water extract.

When the drug is given by hypodermic injection, uterine contractions follow, lasting from thirty minutes to about two hours or longer, with an average duration of about one hour. They are increased in intensity and the intervals diminished. When the substance is given to a patient in labor the first effect of the drug is shown in less than ten minutes. In the beginning these contractions are not painful, and in cases in the second stage the great increase in strength and efficiency of contraction is not accompanied by a relative increase in the patient's suffering. The uterine contractions are not tetanic, although in some cases they are sufficiently prolonged and severe to cause anxiety if the patient has a diseased uterus or disproportion between child and pelvis. Blood-pressure is increased by the drug on the average of 18 to 24 mg. of mercury. This increase gradually develops for twenty to thirty minutes, followed by a slow return within an hour to the pressure which was present before the injection. Most patients are not poisoned by the substance, but there are some who have nausea and vomiting after taking it, and even collapse.

Labor can be induced by the use of pituitrin, but should there be failure of the cervix to dilate and failure of the head to advance and engage, both mother and child would be brought into great danger. The substance should never be used when there is considerable disproportion between the head and the pelvis; but when no such disproportion exists the drug will often cause the head to engage so that the forceps can safely be used. When, however, pituitrin fails, mother and child are left in a critical condition, often demanding a radical operation. Rupture of the uterus has followed its employment.

The disadvantages following the use of pituitrin have become evident through experience. Practitioners who have employed this substance extensively have noted a larger fetal mortality through birth-pressure than under other conditions. This occurs when delivery is delayed while the placenta is being separated from the uterus.

In cases in which there is a diseased or weakened condition of the uterine wall, pituitrin is exceedingly dangerous, and uterine contractions which it produces often result in damage to the perineum. The sudden and prolonged rise of blood-pressure which follows its use may complicate the case. Rupture of the uterus has developed after pituitrin has been given. It is usually thought that hemorrhage is lessened, but pituitrin has not displaced ergot in the stopping of hemorrhage.

Some have claimed that pituitary extract will distinguish between pregnancy and labor, and that if one-third cubic centimeter be given if pregnancy has reached term, uterine contractions will develop; but if such is not the case the uterus will not go into active labor. The effect of the substance in checking hemorrhage is brief and cannot be relied upon to secure permanent uterine contractions. In Cesarean section it is well not to give it until the child has been delivered, as the prompt contraction of the uterus might produce asphyxiation in the infant.

Considerable success is reported by those who have treated intestinal paresis and distention following operation by the hypodermic injection of pituitrin. The dose varies from 0.5 to 1.5 c.c. injected intramuscularly in the gluteal region. The first dose is usually given from four to six hours after operation, and may be repeated a number of times at intervals of four to six hours, according to indications. When the drug acts favorably, gas is passed freely, distention disappears and the patient feels better. It has also a beneficial effect in stimulating the contractions of the urinary bladder, and thus preventing overdistention. When injected into the muscular tissue, local necrosis has followed in some cases.

In some patients in whom the generative organs seem deficient in function, there has been improvement by the use of pituitrin given by mouth. For this purpose the extract of the whole gland derived from both lobes should be employed.

As regards the administration of pituitrin, there seems, fortunately, to be no danger in giving pituitary extract such as is known to follow the administration of thyroid. In one of his cases of acromegaly Cushing gave as much as 100 grains of the whole pituitary gland in extract daily to produce the desired effect. In beginning this treatment it is well to

use 5 grains of the actual dried extract by mouth three times daily, increasing the quantity until improvement is noticed. Many of the tablets placed in the hands of the profession by manufacturers contain accessory substances, and hence represent much less of the active gland substance than their weight might indicate. The best results from gland therapy are those obtained by correct and patient administration over periods of from three months to a year. Many failures in treatment reported are undoubtedly due to the fact that the substance is given for too short a time. Again, the dose may be too small and it often becomes necessary to increase the amount of gland until a definite therapeutic effect is shown.

Unquestionably there is a close relation in function between the pituitary and the sex glands. This is proved by the effects produced by removing the pituitary glands, and, conversely, by the effect produced upon the pituitary body when the sex glands are removed. The anterior lobe is responsible for changes in the development of the sex glands, while the posterior lobe has an important function in regulating, to a considerable extent, carbohydrate metabolism. Absence of the secretion of the posterior portion of the pituitary body is followed by a tendency to gain in fat. The diseases gigantism and acromegaly are now generally believed to be caused by overfunction of the anterior lobe of the pituitary body. The pituitary liquid and pituitrin now in use have a specific effect upon the smooth muscular tissues of the uterus and the intestine, but in obstetric practice the dangers accompanying the use of this substance must not be forgotten.

THE INFLUENCE OF THE PARATHYROID GLAND UPON THE REPRODUCTIVE FUNCTIONS. Voegtlin reviews our knowledge of this subject and gives the results of his own investigations. He finds that tetany is an expression of the reaction of the body to the complete removal of the parathyroid glands. It seems quite probable that this gland has other functions besides its influence on calcium metabolism. In the *treatment of tetany* it has been found that intravenous injections of 4 or 5 per cent. calcium lactate or chloride almost instantly removed the excitability of the nervous system, the muscular twitchings, rapid action of the heart and respiration, and that this treatment relieves pain. No other method of giving these substances seems to produce the same result. The treatment, however, does not save the life of the animal upon whom experiment is made, and death usually follows from exhaustion. The treatment, however, is of value in temporary tetany.

The importance of this in relation to obstetrics is found in the fact that tetany occurs during pregnancy and lactation. Ninety per cent. of these cases occur before the birth of the child. By experiment it has been proved that removal of the parathyroids in a pregnant animal will produce tetany, and this happened in successive pregnancies. The young of animals from whom the parathyroids had been removed show unusual excitability of the nerves.

Our present knowledge upon this subject leads us to believe that the

parathyroid gland has a definite physiological function which is still incompletely understood. For the continuance of life and normal metabolism there must be in the body a minimum of parathyroid tissue. When this is insufficient the galvanic current shows increased irritability of the nervous system, which may be due to the withdrawal of soluble salts from the blood and tissues. Parathyroid insufficiency leads to an alkalosis which is converted into an acidosis as a result of active tetany. After the parathyroids have been completely removed, definite metabolic changes occur in animals.

Unquestionably pregnancy puts an extra strain on the functions of the parathyroid, and this is shown by the appearance of tetany during pregnancy in animals from whom the parathyroids have been partly removed. During lactation in animals having parathyroid insufficiency, tetany has been observed which was cured by stopping the lactation. The influence upon the nervous system after the removal of the parathyroids is shown in the highly nervous condition of animals born from those in whom this operation had been done. While the intravenous injection of calcium or strontium salts, or hydrochloric acid, removes the symptoms of tetany, cure is not permanent. The disease may return and ultimately terminate the life of the animal. The injection of parathyroid extract seems to have a temporary curative effect on animals suffering from tetany. When animals having parathyroid insufficiency are taken and treated by isotransplantation, the result is usually successful. The fact that animals suffering from tetany produced by experiment usually recover spontaneously is thought to be due to the fact that changes occur in their metabolism. A condition of acidosis develops, caused by the hyperactivity of the skeletal muscles during the tetanic movements. There is no evidence, by experimentation, that eclampsia is due to deficient action of the parathyroid. So far as we now know, we can recognize no condition which one might call excessive action of the parathyroids.

THE PINEAL GLAND AND ITS INFLUENCE ON PRENATAL DEVELOPMENT. McCord⁴ gives a complete resumé of the literature upon the subject and an account of experimental work to determine the functions of this body. He finds, in the literature of the subject, that statements and accounts differ very greatly. The pineal gland usually undergoes involution at puberty, and, hence, most manifestations of disease or lack of function occur before this period of life.

When the pineal gland is diseased, we find early sexual development, precocious mental development and general overgrowth of the body, so that a child of six or seven may seem to be fourteen or fifteen.

It is impossible for experimental purposes to extirpate the pineal gland in an animal. We know that it is not essential for the maintenance of life, and that in adult animals its removal produces no changes. Cases in which change has occurred after the removal of the gland are those in which there has been severe injury to the brain, and it is to this and not the removal of the gland that the changes are due.

⁴Surgery, Gynecology and Obstetrics, September, 1917.

If young mammals are given pineal substance, growth and sexual maturity are hastened. In unicellular organisms, pineal extracts increase the rate of reproduction to more than double that of controls. In larval forms, both growth and differentiation are hastened as a result of pineal feeding.

When one compares the effects produced by the administration of pineal substance with that which follows the giving of other glandular extracts it is seen that the pineal gland is unimportant in general metabolism.

THE RELATION OF THE PARATHYROID SYSTEM TO THE FEMALE GENITAL ORGANS. Pool,⁵ by a review of the literature and by his own researches, finds that no direct relationship has been established between the parathyroids and the female reproductive organs. During pregnancy, no essential changes occur in these bodies. It is true that women during menstruation, when pregnant and in the puerperal period, and women suffering from diseases of the pelvic organs or who have had operations upon these organs, are more apt to have tetany than are other patients, and the cause of tetany in puerperal women is now believed to be parathyroid insufficiency. The function of the parathyroids is apparently closely connected with the presence or absence of calcium in the body, and there is reason to believe that calcium is deficient in maternal tetany and lactation tetany. What is known as latent tetany or a subtetanic condition is much more common in pregnant and puerperal women than is usually assumed. In newborn infants the offspring of tetanic mothers, tetany is usually fatal soon after birth. In the treatment of maternal tetany the giving of calcium in large doses is usually beneficial.

THE FUNCTIONS OF THE THYMUS GLAND. Pappenheimer⁶ has gone over the copious literature of this subject and finds that none of our knowledge concerning the functions of the thymus is of clinical value. It is true that in some cases infants dying suddenly are said to have perished from thymus death, and that this is associated with hyperplasia of the thyroid gland, and also with what is called the status lymphaticus. The writer believes that no proof has yet been offered that the thymus is in any way concerned in the mysterious sudden death which happened in these cases. It is true that one occasionally finds in the newborn a thymus gland of unusual size. In the average, full-term, healthy infant the weight of the gland is from 10 to 12 grams and cases have been seen where a weight of 60 grams had been noted. One can readily understand that such abnormally large glands may give rise to pressure phenomena, and yet the actual proof is very difficult. The writer concludes that the fundamental problems of thymus physiology remain unsolved and that the established facts do not lend themselves to clinical application.

THE FUNCTION OF THE PANCREAS AND ITS RELATION TO THE REPRODUCTIVE FUNCTION IN WOMEN. Carlson⁷ finds that the pancreas has a specific function in producing the substance or hormone secreted by the islands of Langerhans which utilize sugar in the tissues. Other

⁵ Surgery, Gynecology and Obstetrics, September, 1917.

⁶ Ibid.

⁷ Ibid.

endocrine organs may influence sugar metabolism in a general way, but this function is specific in the pancreas. The other endocrine glands cannot maintain the power of the tissues to oxidize sugar in the absence of the pancreas, and if the pancreas be normal, disturbance in the function of these other glands does not produce actual diabetes. In the development of acidosis we have not only the failure of the tissues to use sugar, but also lipemia, increased metabolism, lowered resistance to infections and other causes. The majority of evidence points strongly to the fact that true diabetes mellitus in man is primarily the result of pancreatic deficiency. At the present time diabetes cannot be treated by utilizing any of the organic materials, nor is there evidence that the endocrine function of the pancreas has any relation to the reproductive function in women. When a pregnant woman becomes diabetic the fetus perishes, and, if absolute diabetes is present, conception is probably impossible. Women may have a normal reproductive life if they have partial diabetes only and live under careful dietary control, but unless these circumstances are present the occurrence of diabetes in pregnancy results in the increase of the disease in the mother and is extremely injurious to the fetus. During the late stages of pregnancy the fetal pancreas may in some manner perform its function for the mother.

THE INFLUENCE OF THE ADRENAL BODIES UPON THE GENITAL SYSTEM. Vincent⁸ calls attention to the fact that the adrenals are composed of the adrenal substance proper, or cortex, and the medulla, and that there is no evidence that these two parts are functionally related. The medulla is developed from the sympathetic nervous system and has for its function to facilitate the functions of the sympathetic nervous system in certain physiological emergencies. The adrenal cortex is developed from the germ epithelium and there is convincing evidence that it has certain important functions in connection with the development and growth of the sexual organs. Abnormalities in their development may result from tumors of the adrenal cortex. During pregnancy the cortex enlarges.

EXPERIMENTAL EVIDENCE AS TO THE RELATION OF THE OVARY TO THE UTERUS AND MAMMARY GLANDS. Loeb⁹ finds that the ovary is a complex gland whose most important parts are follicles in various stages of growth and atresia, and corpora lutea. Cyclical changes occur both in the ovary and secondarily in the uterus and mammary glands. In the ovary occur the ripening of the follicle, ovulation and the formation of the corpus luteum, and ovulation is controlled by an elaborate self-regulating mechanism. Under normal conditions the corpus luteum inhibits ovulation. During pregnancy the life of the corpus luteum is prolonged. The retarding action of the corpus luteum is chemical and not mechanical; it has also a sensitizing action upon the uterus. If the uterus is incised or mechanically stimulated at the time during which the corpus luteum is elaborating this growth substance, maternal placenta (deciduoma) is formed. Mechanical stimuli therefore assume in this respect the function which the ovum exerts under normal conditions, and each species has a

⁸ Surgery, Gynecology and Obstetrics, September, 1917.

⁹ Ibid.

characteristic response. While in some animals this sensitization is limited to the uterus, in the human subject it is more widely distributed. These experimental deciduomata last but a short time except during pregnancy, when their persistence is prolonged.

As a result of the cyclical ovarian changes there occur corresponding changes in the uterus. This organ has glandular activity and increased circulation. The increased temperature of the organ is probably due to the maturing of the follicles and depends upon the absence of the corpora lutea; growth activity is caused by the secretion of the corpus luteum and retrogression marks the cessation of corpus luteum secretion, which is followed in the interval by a condition of rest. Pregnancy causing a persistence of the corpus luteum is characterized by an accentuation of the active phase and an inhibition of the uterine changes throughout pregnancy. Although it is possible to produce a new ovarian cycle during pregnancy by experiment by cutting out the corpora lutea, this new ovarian cycle is not followed by corresponding uterine cycle. During pregnancy there is a mechanism at work which prevents the mucous membrane of the uterus from responding to the stimuli given off by various ovarian structures. The corpus luteum has at least two functions, that of inhibiting ovulation and that of producing a substance which causes growth in the uterus. The ovary shows other non-cyclical functions. It has a trophic influence on the genitals, and either primarily or secondarily determines the development of the secondary sexual characters.

The ovary controls the development of the mammary gland, exerts a trophic influence on this organ and determines its normal cycle. Following ovulation, proliferative changes occur which cease while the corpus luteum develops and functionates. It is a curious and suggestive fact that the development of mammary cancer in mice is greatly reduced by the removal of the ovaries.

THE RETENTION OF OVARIAN TISSUE AFTER HYSTERECTOMY. Of special interest to obstetricians is a paper by Graves,¹⁰ in which he reviews very thoroughly 233 cases in which both ovaries were removed after hysterectomy, 26 cases in which one or both were left, 53 cases in which transplantation was performed and 17 cases in which the so-called method of Chalfant transplantation was employed. He also reviews the recent literature on this subject.

It is found that those symptoms which follow the surgical removal of the uterus, tubes and ovaries consist chiefly of vasomotor disturbance in the form of hot flashes. Theoretically the vasomotor changes of the artificial menopause are due to a break in the uteroovarian functional harmony by which the physiological balance of the glands of internal secretion is upset and abnormal activity is the result. There seems to be no essential difference whether the ovaries be retained, totally removed or transplanted after extirpation of the uterus, for vasomotor disturbances occur with equal frequency after these various procedures. On the other hand, experience abundantly shows that the retention of

¹⁰ Surgery, Gynecology and Obstetrics, September, 1917.

ovarian tissue after hysterectomy is of little, or no, physiological value and may be productive of serious harm. Such retained ovaries may become cystic and may be the site of the development of foreign growth.

In cases in which it is desired to remove a child by the Cesarean operation and to prevent further impregnation, the most efficient method consists in removing the body of the uterus and the Fallopian tubes. The question then arises, Shall the ovaries be left? One must remember that in Graves's article he is speaking of extirpation of the uterus and not, strictly considered, of hysterectomy. In the experience of the reviewer, the removal of the body of the uterus and Fallopian tubes, leaving one or both ovaries in women considerably too young for the natural menopause, has been followed by very satisfactory results. Menstruation has sometimes occurred from the cervical stump, there have been no symptoms of menstruation and the patient has continued in excellent general health. Evidently this operation does not sufficiently disturb the circulation and the vasomotor nervous supply to interfere with the condition of the ovaries, and, evidently, there is sufficient ovarian nutrition left to prevent extensive degeneration.

On the other hand, the reviewer has repeatedly, after Cesarean section, removed the body of the uterus, ovaries and tubes, the patient making a satisfactory recovery. These patients nurse a child very successfully and often longer than patients in whom the ovaries are retained. It seems reasonable to suppose that the continuance of nursing in some way lessens the severity of the symptoms of the menopause.

THE PREPARATION AND STANDARDIZATION OF PLACENTAL EXTRACTS. Morley¹¹ draws attention to this important subject. If results are to be obtained, and if accurate knowledge can be gained upon this subject, the extracts employed must be accurately prepared, and after definite standards. Morley's researches indicate that up to the present time nothing practically efficient has been done in this way. Unquestionably, some of the bad results obtained in the laboratory and the clinic are due to the faulty preparation of these extracts and the presence of injurious by-products.

THE PLACENTA AS A GLAND OF INTERNAL SECRETION. Frank¹² believes that Halban's work was correct, from which he showed that the placenta has a definite action on the uterus and mammary glands. In animals from whom the sexual organs have been removed, and equally in those who have not so been treated, placental extract, especially containing lipoids, rapidly produces hyperplasia of the uterus, the glandular tissue and the nipples of the breasts. The chemical substance thus acting is thermostable, very resistant to strong alkalies and acids and completely soluble in 95 per cent. alcohol. In its physical, chemical and biological properties this substance appears identical with a similar one obtained from the corpus luteum. Furthermore, this substance is powerful in the absence of the thyroids, adrenals, pancreas and in the absence of thyroid and adrenals combined.

These facts lead naturally to the question as to whether the placenta

¹¹ Surgery, Gynecology and Obstetrics, September, 1917.

¹² Ibid.

acts merely as a storage reservoir for corpus luteum secretion during the latter half of pregnancy or whether the placenta elaborates a hormone of its own.

THE RELATION OF THE SEX GLANDS TO METABOLISM. This subject, upon which so much experimental study has been bestowed, is reviewed by Merlin and Baily.¹³ Unquestionably the removal of the ovaries in animals is followed by an increase in weight and the lowering of metabolism at a rate of from 5 to 6 per cent. It is not, however, proved that this result follows directly from the loss of a specific stimulus from the ovary affecting the processes of oxidation in the cells.

PREGNANCY.

The Beginning of Pregnancy. Pryll,¹⁴ has made observations to determine the usual period from the beginning of pregnancy. He finds that the eighth day after the beginning of menstruation is the time at which conception is most liable to occur. The common belief as regards sex, that male children preponderate during a time of war is verified by observation, there being 9 per cent. of male births above the average during such a time.

The Diagnosis of Pregnancy by Chemical Examination. In view of the difficulty which often attends a positive diagnosis of early pregnancy, any method is welcome which enables one to appreciate changes in the body which can be demonstrated by chemical or pathological methods.

Morriß¹⁵ has examined the blood of 11 patients in various periods of pregnancy to determine the normal blood-sugar content which prevails during pregnancy and the puerperal period. The average of this is given as 0.09 to 0.11 per cent. It is interesting to note that this varies greatly with the presence of muscular contraction. During the early stages of labor the sugar values are practically normal, but as labor proceeds to the expulsive point in the second stage the blood-sugar is increased. In 28 cases at the moment of birth the percentage of blood-sugar in the mother was 0.132. This is increased by an anesthetic, although it is largely due to the mother's voluntary muscular exertion. At the moment of birth, blood-sugar in the fetus reaches its lowest point, and is then lower than the mother's.

In 24 normal cases, in most of which an anesthetic was used, the average fetal blood-sugar content was 0.115 per cent. The interchange of glucose in the circulation of mother and child can be understood by its concentration and passage through the placenta by diffusion, and the fact that in the fetal blood the glucose has a lower concentration shows that it passes from mother to child. After obstetric operations glucose is increased in the blood of both mother and child, and is supposed to be the result of the anesthesia. Curiously enough, in the toxemia which precedes eclampsia the percentage of sugar remains unchanged in the blood of the mother. As soon as convulsions begin, however,

¹³ Surgery, Gynecology and Obstetrics, September, 1917.

¹⁴ München. med. Wehnschr., November, 1916.

¹⁵ Bulletin of Johns Hopkins Hospital, April, 1917, vol. xxviii, No. 314.

the percentage rises, and this is also true when the kidneys are involved to any appreciable extent.

The National Institute of Mothercraft.¹⁶ The importance of conserving the population is appreciated by those now at war. In various countries the governments are taking action to care for women and infants to promote the growth of a sound and healthy population. In England a project is on foot for a National Institute of Mothercraft to be housed in the center of London where it will be easily accessible. It is not intended to be a school for mothers but to be the headquarters of information and material for the training of students and workers concerned in the welfare of mothers and children. It will include a day nursery, nursery schools for children from three to five, a school for mothers and an infant clinic. There will be an observation ward for babies, students' training department, reference and reading libraries, museum and exhibition room. This institute will embrace every agency for conserving the health and lives of mothers and infants. Scattered activities will be brought together at this one place and a staff of specialists will carry on the work.

Work for Mothers in Factories. Doléris,¹⁷ and others of the French Academy, have taken up the question of the practical measures most useful to protect women who work in factories during their pregnancy and also women who are nursing infants and are obliged to work. It was considered most important that the authorities controlling munition factories should give these women only work requiring moderate effort in the exercise of strength and of moderate duration. Work which causes unusual strain and insufficient sleep should not be given to these persons. If possible a half-day's work of six hours, without night work, should be the rule. For the last four weeks of pregnancy these women should not be allowed to work. Opportunities should be afforded to consult physicians, and physicians should be placed in charge of munition works to guard the health of those who work there. A woman superintendent to look after the hygiene of the women workers should be provided, and comfortable rooms for the use of nursing mothers, and prizes should be given to those who care best for their infants. To those pregnant and nursing women who cannot do full time there should be given an indemnity to compensate them for the reduction or loss of wages. The expense of this should be guaranteed by the State, and the authorities should care for the children of those women who are left at home by their mothers while they work in factories.

Comparative Mortality. This subject is of especial interest in view of the waste of population now going on through war. Kroon¹⁸ has made a study of the mortality statistics of the Netherlands for males and females. He finds that males have a higher death-rate than females at corresponding ages, and that this is most marked at the first year of life. During the years 1910 to 1914 for each 100 female infants dying during the first two months 139 male infants perished. This proportion

¹⁶ London Letter, Journal of American Medical Association, January 27, 1917.

¹⁷ Bulletin de l'Académie de médecine, March 13, 1917.

¹⁸ Nederlandsch Tijdschrift voor Geneeskunde, May 12, 1917.

gradually diminished to the end of the first year. This observation is confirmed by reports from large maternities on the continent showing that more male children are stillborn in proportion of 4 to 1 of female children. At the age of ten and after, the mortality among boys is less than among girls, but after eighteen the mortality of males rises and keeps above the mortality of females during the remainder of life. During the age of child-bearing the mortality of married women is higher than that of men, but with this exception the mortality of the male is higher than that of the female throughout the greater portion of life: If the male population is to be conserved to meet the demands of war there must be special attention paid to the birth and care of male children.

In the *Wisconsin Medical Journal*, March, 1917, Mendenhall calls attention to the *mortality and morbidity among infants* during the first days and weeks of life. In the State of Wisconsin over 50 per cent. of infant deaths occur during the first months of life, and over four-fifths of these are due to prenatal and natal conditions. Among women the death-rate from maternity is gradually increasing, puerperal sepsis accounting for nearly one-half of maternal deaths and increasing steadily in its ratio. Another important factor is eclampsia, and maternity is a greater danger to women between fifteen and fifty than tuberculosis and cancer. In Wisconsin there are few midwives, and physicians deliver five-sixths of the cases. There is no proof that midwives are more responsible for the development of sepsis than is the general practitioner. Very frequently the midwife is a safer attendant of normal labor. It is almost impossible to obtain a correct estimate of deaths from maternal sepsis, as death reports are frequently made out wrongly to shield the attending physician. These conditions will not be better until obstetrics is recognized as an important specialty, abundant hospital accommodations are provided for maternity cases, puerperal sepsis is made a disease which should be published and the care of the child-bearing woman is made the object of State activities.

Prenatal Work. HOW MUCH CAN BE DONE IN PRENATAL WORK IN GENERAL is reported by Davis.¹⁹ This work was done in certain wards in the city of Boston during 1914 and 1915. It embraces proper medical examination of pregnant women and advice based upon such examination, visits from trained nurses with instruction in the hygiene of pregnancy and reports to the physicians, expert medical care at the time of confinement and frequent visits of a nurse for two weeks or more after confinement. Over 2000 cases are thus managed annually, which is about one-tenth of the births in the city of Boston. Ninety-six per cent. of the women were confined in their homes, and prior to confinement the nurses visited them about every ten days. The percentage of the death-rates of 731 infants shows a reduction of one-half to one-third among infants receiving prenatal care. A corresponding reduction in death-rate was noted during the first week, month and year of life. The proportion of stillbirths was only one-half that of the general population.

¹⁹ *Boston Medical and Surgical Journal*, 1917, No. 176.

THE VALUE OF NOTIFICATION IN THE CARE OF PREGNANT WOMEN. This experiment has been tried in England, and Moore²⁰ reports in the Section on Obstetrics and Gynecology.

The notification of cases of pregnancy is voluntary in Huddersfield; a fee of about sixty-five cents is paid to the doctor or midwife for each notification; the patient of course consenting before the notification is made. Each patient is visited by a duly qualified and registered physician; no treatment is undertaken. Suitable cases are referred to the family doctor. Whenever it is needed, material aid is obtained from charitable persons or from organizations, and this does not come from the sanitary authorities. In ten months 1536 births were notified and 156 pregnancies, making 10 per cent. of the total occurring in the place. The greater number were notified by midwives. Of these there were 130 uncomplicated cases and 26 that were complicated, making 20 per cent. of complicated cases. This embraced the various pathological conditions arising during pregnancy. The result of this experiment has been successful, and it is commended for adoption by others.

The editorial comment on the NECESSITY FOR THE CARE OF POPULATION, *British Medical Journal*, June 16, 1917, gives a statement which calls attention to the action of the medical authorities of the British Empire to conserve the infant population. In line with this is the welfare work in factories under the auspices of the Royal Institute of Public Health. As an illustration of the way in which disease may be conveyed to infants, Weber²¹ calls attention to congenital tuberculosis. While few conclusively genuine cases are on record there can be no doubt that this disease exists and that this infection can be readily carried. These facts emphasize the necessity for hygiene in conserving infant life.

PRENATAL CARE. Child²² gives the results of the work of the Division of Child Hygiene, Bureau of Health, Philadelphia, in improving the health of pregnant women and thus obtaining better results for mother and child. This is now carried on by organizations in 186 cities of the United States by 286 agencies. The Division of Child Hygiene of the Philadelphia Bureau has 48 municipal nurses and their work covers about one-fifth of the city. They are hampered from the fact that there is no central bureau for the registration of maternity cases. They cared for approximately 2000 pregnant women during the year 1916, of whom a small proportion, comparatively, went to a hospital for delivery. Every effort is made to help pregnant women to care for their general health and the results are shown in a considerable decrease in maternal mortality and morbidity.

Maternal Insurance is considered by Lehrfeld²³ as the universal demand for the protection of maternity. The necessity for this can be realized when it is remembered that in 1913, 150,000 women died in the United States from conditions incident with childbirth, and 250,000 infants died during the first year of life. Of these, 25 per cent. could have been saved. Such insurance must be granted by the State and should secure

²⁰ Proceedings of Royal Society of Medicine, 1916.

²¹ British Journal of Children's Diseases, 1916, No. 12.

²² American Journal of Obstetrics, October, 1917.

²³ Ibid.

for the women competent medical care with adequate compensation to the physicians.

Prenatal Care in the City of New York. Lobenstine²⁴ reviews the situation in New York City concerning the mortality and morbidity of infancy. From the percentage of statistics he finds that the United States has a higher percentage of deaths among mothers from conditions caused by childbirth than other countries of the world with the exception of Switzerland and Spain. In the United States more women die between the ages of fifteen and forty-five from causes connected with maternity than from any other cause except tuberculosis. While the death-rate has been reduced from diphtheria, typhoid fever, tuberculosis, croup and other preventable causes there is no diminution in the death-rate which accompanies parturition. Of infants born, 48.5 per cent. die before they are two months old. Much of this mortality comes from prenatal disease and the remainder from injuries during birth. The percentage of statistics in other cities shows that 50 per cent. of the deaths occurring during the first year of life arise from causes operative before birth. Much of this arises from too frequent child-bearing and the haste on the part of the mother to resume her usual mode of life after the birth of the child.

The results of study of the conditions in New York show that there must be a radical change in the method of approaching this problem. It is thought that there should be a uniform birth certificate throughout the registration area of the United States and that the prenatal and natal causes of stillbirth should be studied in an intensive manner. The mid-wife should be gradually eliminated and a higher standard of obstetric practice and resources should be secured. While there is a pressing need in the large cities for more hospital beds for maternity cases there is a special lack of improved facilities for respectable persons in moderate circumstances.

MATERNAL MORTALITY OF CHILDBIRTH IN THE UNITED STATES. Meigs, of the Division of Hygiene, United States Department of Labor, at Washington, publishes in the *American Journal of Obstetrics*, September, 1917, the results of the study of records for twenty-three years, from 1890 to 1913, and during the thirteen years from 1900 to 1913. These records show that there has been a marked decline in the death-rate from typhoid, diphtheria and tuberculosis without a corresponding reduction in the death-rate of puerperal septic infection. When the mortality rate of the United States is compared with that of 15 important countries only 2 have death-rates from childbirth higher than the United States, while Sweden has a death-rate less than one-half that of this country. Tuberculosis only is more dangerous to women in the child-bearing age than is maternity, and the death-rate from childbirth is very near to that of typhoid fever. Underneath all the efforts which have been made to improve the conditions of obstetrics in this country lies the superstition and prejudice that no special skill or attention is needed to care for these cases.

²⁴ American Journal of Obstetrics, September, 1917.

When rural obstetrics is studied, conditions are found which are almost incredible.

Emmons²⁵ describes work done in Boston in the establishment of prenatal clinics and efforts to secure better care for parturient women. Merrill describes work done in the city of Washington and efforts made to secure special care for this class of the population.

The *American Journal of Obstetrics*, September, 1917, devotes an editorial of considerable length to emphasizing the necessity for such endeavor.

Complications of Pregnancy. PREGNANCY COMPLICATED BY INFLAMMATION OF THE TUBES AND OVARIES. Brindeau²⁶ publishes the notes of 93 cases of this condition, of which 12 came under his personal observation. In the great majority of patients the disease had developed before conception occurred. While in some this infection prevents fecundation, in others the result of pregnancy seems beneficial and the chronic lesion gradually clears up. In many patients pregnancy produces complications through adhesions, causing pain and dislocation of the uterus and tubes, and sometimes the development of septic foci. In 31 per cent. septic infection became apparent at the beginning of labor or late in the puerperal period. Inflammation of the tissues surrounding the uterus and generalized peritonitis, often of the perforative type, are the lesions usually seen. The termination of pregnancy, whether by abortion or labor, often sets up an acute process.

In these cases it is far safer to remove the diseased tubes and ovaries during pregnancy as soon as the diagnosis of the condition can be made. In the puerperal state, if the infection is localized, delay should be practised, but if general peritonitis is present, immediate section will occasionally save life.

In the 93 cases operation was done in 44, of whom 38 recovered, a mortality of 14 per cent. In the 6 deaths, 2 followed colpotomy, 2 hysterectomy, 1 salpingectomy and 1 laparotomy. There was no mortality after 10 bilateral removals of the tubes and ovaries, 5 removals of the tube and appendix, and in 10 operations for removal of the tubes there was but one fatality.

Of 49 patients who were not submitted to operation 19 recovered, a mortality of 62 per cent. This indicates the gravity of the condition and the wisdom of promptly treating these patients by surgical interference during pregnancy and at the earliest possible moment.

EMPYEMA OF GALL-BLADDER COMPLICATING PREGNANCY. Moulden²⁷ reports the case of a multipara who had frequent attacks of sharp pain in the epigastrium radiating into the back under the shoulder blade. This had been growing progressively worse, with headache, fever and chilly sensations. Constipation was present. On examination the temperature was 103.6° F., the uterus was above the umbilicus and there was intense tenderness over the entire right abdomen. While there was no well-developed jaundice, the color of the patient was bad. After

²⁵ American Journal of Obstetrics, September, 1917.

²⁶ Archives mensuelles d'Obstétrique et de Gynécologie, 1917, No. 6.

²⁷ American Journal of Obstetrics, May, 1917.

a hypodermic of morphine the abdominal rigidity lessened somewhat and a mass could be made out under the liver. Upon removal to the hospital there was a leukocytosis of 34,000 and the test for urobilinogen was strongly positive.

Upon opening the abdomen an enormously thickened and enlarged gall-bladder, adherent to the omentum and colon, was found. After packing off the surrounding area, the gall-bladder was emptied through a trocar of very foul pus. The fundus of the gall-bladder was opened and 17 small stones were scooped out of the cystic duct. Palpation revealed no further stones and the wound was then closed in layers around a large rubber drainage tube sewed into the incision in the gall-bladder. The patient made an uninterrupted recovery, with repeated symptoms of threatened abortion. This was controlled by morphine and atropine, and the patient went to term and gave birth to a vigorous male child. The wound did not close but repeatedly opened, and the patient again came to the hospital for removal of the gall-bladder.

On reopening the wound, stones were found in the ducts, and these were gradually pushed into the gall-bladder and the gall-bladder removed unopened. A stone was found in the common duct obstructing it, and it was necessary to open the duodenum, when five small, adherent stones were found and removed. Drainage was secured by the use of tubes and a cigarette drain. The opening for drainage closed in about ten days, bile appeared in the fecal discharges and the patient has made an uninterrupted and permanent recovery.

PYELITIS AS A COMPLICATION OF PREGNANCY. Gammeltoft,²⁸ has found in many cases of pyelitis, that the first symptoms of the disease point to some other intra-abdominal affection. The colon bacillus is the cause in 70 per cent. of cases, and this probably comes from the intestines. Very few pregnant patients escape constipation and disturbance of the gastro-intestinal tract. When an acute pyelitis develops, the patient has fever suddenly, often accompanied by a chill and great depression. Nausea and vomiting are common. The pain may suggest labor pains and is often diffuse at first, finally becoming localized over the right kidney, occasionally over both. While in abdominal diseases the tongue is often dry it is not often the case in pyelitis. Sometimes there are tenderness and pain along the ureter and bladder and in both legs. When the patient's history is taken it is found that she has had pain in the lumbar region for an indefinite time, that she has been obliged to empty the bladder frequently and with pain. The urine is turbid, acid in reaction and has putrid odor suggesting colon bacillus infection, and albuminuria may be present. When the urine is perfectly normal the ureter has become obstructed on the affected side, and only urine from the sound kidney reaches the bladder. This is seen especially often in puerperal patients.

The temperature will often change abruptly from over 103° F. to sub-normal, but there is no characteristic general depression which one would expect. After the illness has continued about ten days the con-

²⁸ Ugeskrift for Laeger, January 18, 1917.

dition becomes chronic. In the later stage the only symptom may be indefinite pain in the lumbar region and the frequent desire to empty the bladder, which may be ascribed to the condition of pregnancy. To make a positive diagnosis the urine should be thoroughly examined and cultures taken to recognize bacteria.

In the puerperal period the ureter may be stretched and kinked, thus causing obstruction and sudden acute disturbance. The rise of temperature which accompanies this condition is often thought to be caused by septic infection. Some cases of acute pyelitis in the puerperal period closely resemble beginning pneumonia. It may also be difficult to distinguish between pyelitis and appendicitis. To make a positive diagnosis it may be necessary to use the cystoscope and to catheterize the ureters.

So far as *treatment* is concerned, rest in bed and the free use of liquids may be supplemented by using salo, a sulphuric acid mixture of urotropin. This latter may produce a slow and painful discharge of urine or even a bloody urine, and increase albuminuria and the number of casts. To get the benefit from urotropin the urine must be kept acid, and this may be done by adding dilute hydrochloric acid. Urotropin should be given in doses of 50 cg.; the ureter may be catheterized when there is reason to believe there is obstruction to the discharge of urine, but the author considers it dangerous to flush out the kidneys while the catheter is in place. Such a procedure may spread infection to the kidney substances. The catheter must not be left in the ureter, as it may cause hemorrhage. Placing the patient on her other side will often relieve the ureter from pressure and bring relief. Flushing the bladder will often do away with obstruction by reflex action. When the acute attack has subsided, but leukocytes and bacilli are still present, the patient is allowed to get up, but salo should be continued for some time. As to preventing a return of the disorder, an autogenous vaccine may prove useful, and it is curious to observe that affected urine finding entrance into the vagina does not cause puerperal septic infection. These cases should be kept absolutely quiet until the urine is free from leukocytes and the temperature has been normal for some time.

PREGNANCY COMPLICATED BY ENLARGEMENT OF THE BREASTS. Kosmak²⁹ reports the case of a woman, aged 32 years, who had given birth to one child in difficult labor. She became a patient at the Lying-in Hospital of New York when about seven months pregnant, complaining of a severe pain in the back and abdomen, with constipation and disturbance of digestion, and great enlargement and pain in the breasts. Upon examination both breasts were engorged, tender and painful, and there was marked enlargement of the veins over the entire chest, neck, upper arms and abdomen. The breasts were firm, and lumpy in places resembling the ordinary caked breasts. The skin was tense, smooth and not inflamed. There was no fluctuation present and nothing could be felt in the axillæ. The vaginal examination was negative and so

²⁹ American Journal of Obstetrics, September, 1917.

was the examination of the heart and lungs. Although the patient's digestion improved somewhat under treatment she lost weight and her appetite was very poor. She gave birth spontaneously to a premature child. After the bowels had been freely emptied by cathartics several masses could be felt in the abdomen which were undoubtedly carcinoma. The patient subsequently died of exhaustion. No record of autopsy is given, but it is thought that the case was originally malignant disease of the abdomen, complicated by metastasis in the mediastinum, with obstruction to the circulation, which produced swelling and tension in the breasts.

The description of this case calls to mind to the reviewer the case of a pregnant woman who suffered from enlargement of one breast during her pregnancy. She was treated by Christian Scientists without avail, and when she came under observation the breast was much enlarged, tense and the skin red and glistening. The patient's general health was fairly good. Malignant disease of the breast was suspected and the patient was advised to submit to its removal, which she declined. Finally, pain became so intense from tension that under gas anesthesia an incision was made, followed by the discharge of a considerable quantity of bloody fluid. The gloved finger inserted through the incision found the characteristic condition of mammary carcinoma. The patient died shortly after the birth of her child from what was apparently rapid spread of malignant disease.

TWIN PREGNANCY COMPLICATED BY RAPID HYDRAMNIOS. Chambre-lent³⁰ states that it is a comparatively rare occurrence for hydramnios to develop suddenly. There are about 50 cases in the literature. His case was that of a woman in her third pregnancy whose first labor had been normal and who had hydramnios during the second pregnancy developing very slowly, and labor at term. There was abundant fluid, a prolapse of the cord, breech presentation and a living child.

In the pregnancy in question, nothing abnormal showed for five and a half months. The abdomen became greatly distended within a few days; the fundus reached 43 cm. above the umbilicus and the circumference of the abdomen at the naval was 123 cm. About the seventh month the symptoms were so distressing that intervention was decided upon and twin children were delivered. The placenta was composed of two joint masses, and six or seven quarts of amniotic liquid escaped during the delivery. The patient made an uninterrupted recovery.

PREGNANCY COMPLICATED BY OCCLUSION OF THE INTESTINES CAUSED BY THE UTERUS. Planchu³¹ had under observation a primipara, aged thirty-six years, who had completed eight months of pregnancy. There was a great deal of abdominal distention, total absence of fecal matter and gas for twenty-four hours and nausea and vomiting every three hours. Purgation and intestinal irrigation had no result. After two days without improvement the positive diagnosis was made of occlusion. The child was living. The patient's general condition remained surprisingly good and so labor was induced, followed by the expulsion of a large quantity of gas and bowel movements and the rapid recovery of the patient.

³⁰ Ann. de Gynec. et d'Obst., 1917, No. 43, p. 37.

³¹ Ibid., 1916, No. 42.

PREGNANCY COMPLICATED BY INFLAMMATION OF THE TUBES AND OVARIES. Brindeau³² contributes a paper upon this subject in which he gives the report of 12 cases observed personally. He also tabulates cases collected from the literature. He concludes that inflammation of the tubes and ovaries does not always make conception impossible later on. When the lesions present have existed for a long time they do not, as a rule, cause complication during pregnancy or labor; on the contrary, this condition becomes somewhat better in some pregnant patients.

In some cases, however, subacute or acute inflammation of the tubes and ovaries may cause more or less serious accidents should the woman become pregnant. Some of these complications are essentially mechanical. These patients have pain, adhesions, flexion of the uterus, torsion of the Fallopian tube and ectopic pregnancy. The most important complications are septic and they produce very bad effects at the beginning or termination of pregnancy, less often in the parturient period. Abortion and labor seem to stir up pathological conditions into new activity. Peritonitis, either general or localized, is the lesion produced in the tissues about the adnexa and uterus. Acute peritonitis is the result of perforation and may occur promptly at any time, and is often fatal. Surgical treatment only can be efficient in dealing with this condition, and in the presence of inflammation of the tubes and ovaries no time should be lost before operating. This should be done to save the life of the mother and permit the pregnancy to go on to term. If the patient has expelled the product of conception she should be treated as if the complication had arisen in the puerperal state. When inflammation seems to be localized, interference should not be practised, although the obstetrician should stand ready to operate at any time, but delay should be practised until acute symptoms have subsided; in the presence, however, of general peritonitis, interference should be undertaken at the earliest possible moment.

Abdominal section may save lives of patients otherwise doomed to certain death. In 44 cases collected from the literature, in which surgical interference has been practised we find, 5 colpostenosis with 3 recoveries; 1 incision of abscess with recovery; 1 craniotomy with recovery; 10 salpingectomies, with 9 recoveries; 3 laparotomies, with 2 recoveries; 4 hysterectomies, with 2 recoveries; 11 bilateral castrations, with 11 recoveries; 1 cured of ileus, with an authentic recovery; 5 appendectomies and salpingectomies, with 5 recoveries; 3 removals of Fallopian tube for torsion, with 3 recoveries. This makes a total of 44 cases, with 38 recoveries, or 86 per cent. When one compares the percentage of recoveries among those patients who were not operated they find 49 cases, with 19 recoveries, or 38 per cent. that survive.

Brandeau's personally reported cases embrace left-sided salpingectomy, with vomiting and peritonitis, double salpingectomy and abortion and peritonitis, adhesions so binding down the pregnant uterus that pregnancy to full term was impossible, multiple abscess of the ovary

³² Archives mensuelles d'Obstétrique et de Gynécologie, January, February and March, 1917.

with peritonitis and abortion, and hysterectomy, partial, for salpingitis upon right side and on the left side ectopic gestation.

PREGNANCY COMPLICATED BY TUBERCULOSIS TREATED BY STERILIZATION THROUGH AN ABDOMINAL INCISION. Hussey³³ reports a patient, aged twenty-two years, in the fourth month of gestation, who entered the obstetric service of the Brooklyn Hospital because she was tuberculous, and it was thought best to interrupt the pregnancy and sterilize the patient. Her family history was good and her health had been normal up to three years previously. She had had 3 children, and after the birth of the last there was pain and disability referred to the urinary bladder. She had been treated in a hospital for bronchitis, acute cystitis and pyelitis. The left kidney had been removed subsequently and was found tuberculous, with many abscess cavities. The bladder showed ulcers about the openings of the ureters and at the base. The right kidney was apparently normal, but in the lungs there were signs of catarrhal bronchitis most marked in the lower right lobe. Tubercle bacilli were wanting in the secretion. The patient had a cough which improved by the removal of the kidney, and she gained considerably in general health. She returned to the hospital three months pregnant and not feeling well. Upon examination the temperature was normal and the lungs showed no acute process. The urine was practically normal. The patient complained of daily headaches and occasional night-sweats, with pain in the region of the bladder and disturbance of urination. After consultation it was decided to interrupt the pregnancy and sterilize the patient.

Under morphine and nitrous oxide-oxygen anesthesia the fundus of the uterus, with the ovum *in situ*, was removed by abdominal section. The patient made a rapid, uninterrupted recovery. Her general health improved steadily after the operation. Upon examining the bladder considerable improvement was found in that condition.

In cases of this sort the operator has his choice of a number of procedures; one is vaginal hysterotomy, with or without resection of the tubes, through an incision in the anterior fornix; the reports of this operation indicate that in some cases hemorrhage may be excessive. Another procedure is total hysterectomy with the removal of tubes and ovaries, which gives an excellent result in some cases. Selheim's procedure consisted in opening the abdomen and uterus, removing the ovaries and resecting the Fallopian tubes. This also may be complicated with considerable bleeding, and there is some risk of implanting tubercles in the peritoneal cavity. Perhaps the simplest efficient procedure in these cases is that of von Bardeleben, which consists in removing the fundus of the uterus with the ovum *in situ*. This has the merit of causing very little bleeding, is followed by prompt union, and usually by prompt recovery.

PREGNANCY COMPLICATED BY EPILEPSY. Albeck³⁴ has carefully studied records of a number of cases of eclampsia in pregnant women, and is convinced that some of them have status epilepticus. It is difficult to distinguish between the two when the epileptic fits occur in patients

³³ American Journal of Obstetrics, June, 1917.

³⁴ Hospitalstidende, Copenhagen, July 18, 1917.

having albuminuria and edema. If a history of previous convulsions can be obtained it is very significant, for eclampsia rarely, if ever, occurs twice in the same patient. Blood-pressure is little altered in epilepsy but is rarely normal in eclampsia. When pregnancy is allowed to go on, the mortality of *status epilepticus* is very high and considerably exceeds that of eclampsia. In 3000 pregnant women, Albeck found a tendency to convulsions in but 51 cases. One epileptic woman seemed actively threatened with convulsions a few weeks before labor, but was delivered of a child at term by section and escaped both epilepsy and eclampsia. The writer believes that the occurrence of either eclampsia or *status epilepticus* calls for the prompt interruption of pregnancy.

PREGNANCY COMPLICATED BY FISTULÆ. Bertino³⁵ discusses the subject of vesicovaginal fistulæ and uterovaginal fistulæ complicating pregnancy. He describes the case of a woman, aged twenty-two years, who had a contracted pelvis caused by rickets. The patient was allowed to go into labor with the idea of interfering should necessity arise. As the patient failed to deliver herself the forceps was applied and a female child was delivered in a deeply asphyxiated condition. It could not be resuscitated and died about three hours after birth. There was a considerable perineal laceration in the mother, and this was immediately closed. During her convalescence the patient complained of pain in the sacral region, with difficulty in movement and disturbance in micturition, there finally developing a vesicovaginal fistula and also a uterovaginal fistula. The parts were kept clean by antiseptic injections and the patient was subsequently treated by operation; the ultimate result was satisfactory. The writer reviews the literature and finds 9 different methods proposed for the treatment of this condition. Evidently each case must be studied upon its own merits, and the surgeon must decide the method of operation in accordance with the conditions found in the individual patient.

PREGNANCY COMPLICATED BY MYOMA. Heimo³⁶ believes that many cases of subinvolution of the uterus after labor are due to the presence of a myoma whose existence is not expected. When these tumors are small and grow soft during pregnancy, they do not, as a rule, interfere with delivery. During eight years' clinical experience at the Maternity Hospital in Geneva, Switzerland, operation was indicated in but 4 cases of labor complicated by myomatous tumors. These women were more than thirty years old and had suffered so severely by reason of the myoma that hysterectomy was performed. To diagnosticate the presence of myoma, the uterus should be rubbed lightly to induce it to contract. This throws the tumor into strong relief, but if the protuberance is caused by part of the fetus it disappears as the uterus contracts over it. If operation is to be done, it should be through the abdomen. Sterility is present in about 20 per cent. of cases of myoma.

Diagnosis of Syphilis during Pregnancy by the Wassermann Reaction and the Examination of the Placenta. Slemmons³⁷ has studied this subject

³⁵ *Annali di Ostetricia*, February, 1917.

³⁶ *Annales de Gynécologie et d'Obstétrique*, March-April, 1917.

³⁷ *American Journal of Medical Sciences*, February, 1917.

in the Department of Obstetrics and Gynecology in the Yale Medical School.

Concerning the Wassermann reaction, it is found that occasionally fixation has been observed in malaria, cancer, diseases of the liver and some tropical disorders. So also in a certain number of syphilitics the reaction is negative during the secondary period of the disease. If taken in the light of the clinical history, a Wassermann reaction is rarely misleading, but implicit reliance cannot as yet be placed upon this test. With newborn infants it is specially misleading.

The phenomena shown in the placenta in syphilitic cases are frequently not clear. The microscopic signs of the disease are not constant, and in a group of 100 syphilitic placentæ examined were absent in 82. The fetus sometimes dies before it is born from other causes than syphilis, and the placenta may be firmer than usual, its color a pale gray and the maternal surface have a greasy appearance. It has been supposed that enlargement of the placenta was characteristic of syphilis, but this is not always true, for in cases in which syphilis could be excluded, the ratio between fetus and placenta was sometimes 5 to 1, 4 to 1 and occasionally 3 to 1. When the infant is premature this ratio is more significant, but it must be remembered that normally, before term, the placenta weighs more than one-sixth the weight of the fetus.

There is no characteristic lesion of syphilis invariably found in the umbilical cord. It is often difficult to demonstrate spirochetes, and inflammation about the vessels of the cord may be caused by bacterial infection. In typical cases of syphilis the infiltration appears at the fetal end, when placental bacteremia is present at the maternal end of the cord. There are so many exceptions to these clinical rules as to make diagnosis uncertain.

The most reliable evidences of placental syphilis are the histological changes in the chorionic villi. When these are freshly teased in hydrochloric acid or in water and examined under the microscope, the syphilitic villi appear abnormally large, opaque and irregularly shaped, with swollen ends. The branching is limited and the bloodvessels are indistinct. Stained sections of tissues should be made, if necessary, for a positive diagnosis. These will show a proliferative inflammation in the walls of the smallest bloodvessels—those of the terminal villi. These frequently obliterate the lumen of the vessel. However, some observers deny that the changes in the villi are absolutely characteristic of syphilis.

Under Slemmons's supervision, two series of observations were made: (1) Of 260 consecutive cases of pregnancy, and (2) of 100. In 345 of the whole number (95 per cent.), the Wassermann reaction and the placental histology agreed absolutely and indicated the presence of syphilis in 10 cases, its absence in 335 cases. In 1 case the Wassermann was negative, but the fetus was proved at autopsy to have congenital syphilis. The placental findings were specific of syphilitic disease. Other observers have found a negative Wassermann reaction in cases of syphilis. It is interesting to observe that a positive Wassermann reaction is often obtained during the toxemia of pregnancy, and this suggests that this reaction is distinctly associated with a certain form of auto-intoxication.

Thus in active eclampsia from 25 to 50 per cent. of cases give a positive Wassermann reaction. The quantity of cholesterol in the blood is not responsible for the Wassermann reaction.

The results of these studies seem to show that the Wassermann reaction and the placental findings agree in 95 per cent. of obstetric patients. The chief source of confusion is found in the toxemia of pregnancy, which may be responsible for a positive reaction. In these cases the fixation should not be taken to mean the actual presence of syphilis, and, if this be granted, the serological test and the placenta agree 99 times out of a 100. In the present stage of our knowledge when it is desired to make a diagnosis of syphilis the freshly teased chorionic villi of the parturient woman should be examined, and it were well if this examination were made a routine practice in dealing with obstetric cases. If the appearances point to syphilis, hardened and stained sections of the placenta should be studied and the Wassermann reaction in the mother's blood determined. These observations should be made whenever the fetus is premature, macerated or stillborn. Instances in which the Wassermann reaction and the placental findings do not agree are rare, and this discrepancy can usually be solved by a further study of the mother's blood.

Bacteria in the Vagina during Pregnancy. Permar³⁸ has studied this subject in 130 cases of pregnancy in the wards of the Elizabeth Seton Magee Hospital in Pittsburgh. The technic of the study was that which has been found reliable in other laboratories. The results are interesting but somewhat confusing. Thus it is stated that in 13 cases there were definite organisms found, in 11 the Gram-positive cocci were found alone, in 19 the Gram-positive and diphtheroid bacilli were also found. In 17 the Gram-positive bacilli of fair size with square ends, in 12 the negative bacilli and Gram-positive bacilli with coccoid forms, and 31 in which the Gram-negative bacilli alone were found. When the question of streptococci and staphylococci is considered, *Staphylococcus pyogenes aureus* was found in 9 cases, hemolytic streptococci were present in but 5; non-hemolytic streptococci were found in 20; pneumococci in 4. It is interesting to note that streptococci, as such, were never seen in direct smear and that only 26 strains were recovered by making culture.

A study of this sort carried out according to the ordinary modern routine methods shows a variety of organisms with definite strains of each, and is specially important as regards the type of streptococci organisms of the typho-colic group. There seems to be a relation existing between the ability of various groups of organisms to live in an acid medium and the presence of these organisms in the vagina.

The presence in the vagina of streptococci giving the carbohydrate reaction of virulent organisms is comparable to that recognized in the other cavities in which virulent, or apparently virulent, organisms are constantly present without giving rise to disease processes.

This study repeats anew what has been practically demonstrated by clinical observation. Streptococci are frequently found in the vagina

³⁸ American Journal of Obstetrics, April, 1917.

of the healthy pregnant woman, and the less virulent forms of germs are also present in abundance. Like other cavities of the body communicating with the external air, it is practically impossible to keep this portion of the anatomy absolutely free from bacteria. But, so long as the mucous membrane upon which they rest remains intact, their presence causes no harm. Should, however, wounds occur and the bloodvessels and lymphatics be opened, these bacilli find ready access and infection results. It is also reasonable to conclude that it is practically impossible to absolutely sterilize any cavity of the body communicating with the external air. Efforts at sterilization would so wound the mucous membrane as to favor the entrance of bacteria. For securing asepsis in obstetric practice, one must rely upon the aseptic condition of all articles which are inserted within the vagina, the avoidance of wounds, lacerations and bruising, and, should such occur, their prompt closure by suture. Of primary importance is the prevention of hemorrhage which so greatly lessens the resisting power of the organism against infection.

Transmission through the Placenta during Pregnancy. Plass³⁹ believes that one can judge of the possibility of placental transmission between mother and fetus by the relative concentration of given substances in samples of the blood of mother and child. In studying these cases these samples should be collected as nearly simultaneously as possible and the analyses begun at the earliest possible moment. In making experiments the author found by hemolyzing the blood and saturating it with picric acid that higher values for both fractions were obtained. It was already known that fetal blood has a greater hematocrit value than maternal blood. Such variations, however, occur in the percentages in these researches, but no definite conclusions could be drawn concerning the comparative concentration of the two constituents in the blood.

Folin's method was then employed for obtaining the total creatinin. The results of the author's studies show that creatinin apparently passes without the slightest hindrance from mother to child by the simple principle of diffusion.

The Reflex Condition of the Nervous System during Pregnancy. Schneller⁴⁰ has studied cases of pregnancy to determine the reaction of muscles and nerves to galvanic stimulation, increasing with the length of pregnancy and attaining its highest point during labor. He found that after labor irritability was often present, and at this time it gradually diminishes and the decline is much more rapid than was the increase. This he ascribes to the affluence of the organs of internal secretion.

To confirm this he used extracts from various glands in testing the irritability of the muscles and nerves during pregnancy. He found that by this method there was a slight increase which remained above the normal about twenty minutes after the injection and then passed away. Extract of the placenta caused a transient lowering of the muscular irritability. In these researches there was an element of uncertainty in the proteids derived from the muscular tissues and other material used in the preparation of glandular extracts.

³⁹ Bulletin of Johns Hopkins Hospital, 1917, No. 28.

⁴⁰ Inaugural Dissertation, Erlingen, 1914.

The Prevention and Treatment of Weak Feet during Pregnancy. Grossman⁴¹ believes that weak feet are a frequent cause for pain in the back and extremities in pregnant women. In a series of 700 cases, 400 referred pain to the back and lower extremities. As a result of weak ankles and weak feet, pregnant women suffer sprains and fractures, and abortion may be a consequence. When a woman with this complication escapes trouble during pregnancy it is apt to appear during the puerperal period. These patients complain of dull ache or pain in the feet, calves, thighs or back, weakness, tired sensations and coldness or numbness in the feet.

In preventing, he believes it of great importance that a proper shoe be worn. This should be widely open at the top to compensate for the swelling of the legs which pregnant women so frequently have. There should be an elevation of one-eighth of an inch on the inner border of the sole and heel and a crossbar of one-eighth inch to prevent sagging of the arch. A rubber cushion on the heel and a special finish on the bottom of the sole and heel to prevent slipping. The edges of the heels should be rounded to prevent catching in a carpet or dress, and the height of the heel should be carefully adjusted to the comfort of the patient. Shoes should be built on anatomical principles and made so comfortable that they could be worn during the entire day so that they need not be changed for low shoes or slippers at night.

Blood-pressure, Urine and Edema in Pregnancy. Rosensohn⁴² has studied these phenomena during pregnancy by comparison. He finds that the edema so often seen during pregnancy does not of necessity imply the presence of nephritis. It is comparatively independent of blood-pressure. The average primiparous woman in the latter months of gestation has a blood-pressure slightly below the normal; while increased pressure, as a rule, is abnormal, there are cases where no pathological cause for it can be found.

Colostrum as a Sign of Pregnancy. The presence of colostrum in the breasts has been usually considered as one of the most significant signs of pregnancy. Gardlund,⁴³ found colostrum in both breasts of a woman, aged forty-one years, who had 4 children but was not at the time pregnant. She had an edematous myoma of the uterus, for which she entered the hospital for operation. In another patient, aged forty-five years, gonorrhreal infection was present, and some ten months after her recovery there was an abundant secretion of milk in the mammary glands resembling colostrum. In another case a young woman imagined herself pregnant and colostrum was found, but the presence of pregnancy was proved to be a mistake. In another the secretion from one breast seemed to be colostrum, but pregnancy was absent and the patient was suffering from tuberculosis.

With his attention attracted to the subject with these cases, Gardlund had 393 women examined in his clinic. In 82 women who had never been pregnant and who were not pregnant at the time, colostrum was present in 15 per cent., in 127 women who were not pregnant, but who

⁴¹ Medical Record, 1916, No. 90, p. 1074.

⁴² Bulletin of Lying-In Hospital, New York, 1917, No. 11.

⁴³ Hygeia, Stockholm, 1917, No. 3, vol. lxxix.

had children, it was present in 46 per cent., also in 20 per cent. of 63 women who were passing through the menopause.

In 56 pregnant women colostrum was present in 54 per cent. Out of a total of 338 women, colostrum was positively present in 36 per cent., and in 209 non-pregnant women it was found in 33 per cent. This should indicate that it is not of positive value as a diagnostic sign of pregnancy.

The Antitryptic Power of Blood Serum in Pregnancy. Ecale⁴⁴ has studied the action of trypsin during pregnancy in Bar's clinic in Paris. He describes his methods in detail and concludes that the antitryptic power of blood serum increases somewhat during pregnancy, and this goes on from the beginning of pregnancy until the sixth month. This continues during the last month of pregnancy and the early days of the puerperal period. It subsides or disappears the second week after the birth of the child. In cases in which pregnancy is complicated by toxemia, this phenomenon is increased in intensity. While there can be no reasonable doubt concerning this phenomenon, it is not sufficiently clear to make it a valuable source of diagnosis except in doubtful cases. The most reasonable explanation of this condition ascribes it to the penetration of tryptic ferments from the placenta into the maternal blood. As a factor in producing this condition, one must also recognize the presence in the maternal blood of those placental antibodies described by Abderhalden in serum of pregnant patients.

Fatty Bodies and Lipoids in the Serum of Pregnant Women. Ecale⁴⁵ has made studies to determine the presence of fatty bodies in the blood serum of pregnant women. He finds reason to believe that a condition of lipemia exists at the end of gestation, and it is rational to establish a correlation between this condition of fatty excess in most of the viscera which is often seen in pregnant women. It seems most rational to believe that fatty bodies accumulated by the placenta are in reserve and destined for the fetus, which does not use them until the termination of gestation.

The Occurrence in the Urine of Pregnant and Non-pregnant Women of Urobilinogen and Urobilin. Barnard⁴⁶ reports the results of 1005 examinations made for urobilin in the urine of 244 individuals. Of these 160 were pregnant and 84 were non-pregnant. Of the pregnant cases, 148, or 92.5 per cent., showed urobilin in the urine at some time. Subtracting those in which hemocytolysis, or liver disease, could not be excluded reduced the number to 115, or 71.9 per cent. Of the non-pregnant cases, 22 had urobilinuria. Of these, 17 had diseases which might produce changes in the liver or bloodvessels, leaving free from these changes 5, or 0.02 per cent. Indican was found in 26, or 30.9 per cent., of non-pregnant patients. Among pregnant patients urobilin and indican were present in 72 cases, and indican was found in 48.6 per cent. of these patients in whom urobilin was present. Urobilin and indican were found

⁴⁴ Archives d'Obstétrique et de Gynécologie, 1917, Nos. 4, 5, 6, p. 97.

⁴⁵ Archives mensuelles d'Obstétrique et Gynécologie, 1917, Nos. 4, 5, 6, p. 128.

⁴⁶ Lancet, 1917, No. 37, p. 80.

in 12 cases in which pregnancy did not exist, and of those patients who had urobilin in the urine, indican was also present in 54.5 per cent. Among pregnant patients, 844 tests were made of the urine, giving a positive result for indican in 20.6 per cent. and a positive test for urobilin in 62.8 per cent. Both urobilin and indican were positive in 140, and of the tests made positive for urobilin, 26.4 per cent. gave also a positive result for indican. Among non-pregnant patients, 161 tests were made of the urine, giving 21 per cent. positive for indican and 18.6 per cent. positive for urobilin. In 46.7 per cent. the test was positive for both substances. From the study of these cases the conclusions were formed that the excretion of urobilin varies greatly. Bile pigments are formed outside the liver and some other substances than hemoglobin may be found as a source for urobilin. The presence of urobilin in the urine during pregnancy may be physiological and the result of increased metabolic processes in the liver and the increased action of the organs which form the blood of the pregnant woman. This may possibly be influenced by her diet. In view of the fact that so many agencies may influence the formation of urobilin, the qualitative estimation of this substance is of little practical and clinical value.

Vomiting of Pregnancy. VOMITING OF PREGNANCY TREATED BY DESICCATED PLACENTA. Cary,⁴⁷ reviews the literature of the subject, which shows that during the toxemia of pregnancy there is in the placenta an intense atypical proliferation of the syncytium which penetrates the villi. This is associated with certain processes in the placenta, and it has been shown that the injection or use of placental bodies may influence the metabolism of pregnant patients. The writer has collected 13 cases of vomiting of pregnancy in which desiccated placenta was given. One or two developed later in pregnancy and might readily have become pernicious had the patient been allowed to continue. Of the 13 cases, 2 were lost sight of. Of the remaining 11, 7 were almost immediately improved and within a few days were practically well. Two were made better but had to take the extract of placenta for a considerable time. In two the results were not satisfactory, and one of these was a very neurotic individual. He cites 2 cases, multiparae, one six months and the other six weeks pregnant who had violent vomiting. Desiccated placenta was given in capsules, 5 grains, three times daily, with just sufficient water to permit the patient to swallow it. The results were immediately good.

VOMITING OF PREGNANCY RESULTING IN SPONTANEOUS ABORTION. Faugere and Balard⁴⁸ report the case of a multipara, about two months pregnant who received 10 c.c. of antidiphtheritic serum and 4 injections of 25 c.c. of hemostyl. After the last injection, abortion occurred in two days. The embryo was living at the moment of abortion. The uterus was irrigated after the abortion and the mucous membrane about the cervix was thickened and seemed to be prolonged over the entire uterine surface. This diseased condition of the membrane seemed the most

⁴⁷ Surgery, Gynecology and Obstetrics, August, 1917.

⁴⁸ Ann. de Gynéc. et d'Obst., 1916, No. 4, p. 377.

probable cause of the abortion. The patient's previous pregnancy had also terminated in abortion at the end of the second month.

PERNICIOUS VOMITING OF PREGNANCY TREATED BY THE TRANSFUSION OF BLOOD. Garnet⁴⁹ reports the case of a primipara whose condition became so critical from pernicious nausea and toxemia that it was determined to practice direct transfusion. This resulted in such improvement that the patient was enabled to continue the pregnancy; 250 c.c. of blood was injected from a patient who had borne a child ten days previously, who had a negative Wassermann and in whom the hemolysis and agglutination test were negative to the patient transfused.

A second case was treated in a similar manner followed by a considerable improvement and then by relapse. A second transfusion of 200 c.c. was done from a patient who had borne a child seven days previously. This patient also was very much improved by the treatment and enabled to go on in her pregnancy.

The Toxemia of Pregnancy. Losee and van Slyke,⁵⁰ in studying the toxemia of pregnancy, found that neither the blood nor the urine of eclamptic women shows an unusual quantity of amino-acid. The urea is below the average and often very much deficient. With the exception of some specimens obtained soon after the birth of the child the urine rarely showed 70 per cent. or more of urea. The ammonia was often higher, but there was less variation in this than in urea. In the toxemia of early pregnancy accompanied by pernicious vomiting, the ammonia percentages were exceedingly high. None were less than 16.9 per cent., while in pregnant women who were not toxic the nitrogen ratios were normal.

The Influence of Operations on the Genital Tract upon Pregnancy and Labor. Ronschein⁵¹ discusses the question of the results of operations upon the genital tract on subsequent labor. He reports 2 cases in which the perineum had been so repaired as to cause a high rigid perineum against which the child's head could make no progress. Under anesthesia an episiotomy was performed, the child delivered and the incisions closed by suture.

He also describes the case of a patient who had had three normal labors and upon whom had been performed an operation for the cure of prolapse and cystocele which had produced tense bands across the vault of the vagina just anterior to the cervix. When seen she had been nineteen hours in labor. There was a well-defined retraction ring palpable just behind the symphysis. On vaginal examination a dense fibrous band was felt stretching across the vault of the vagina, completely obstructing the descent of the fetal head. By hooking the finger behind this band the cervix was found to be completely dilated, the head on the left side and behind at the brim and the membranes ruptured. The patient was anesthetized, the band completely exposed and severed, when the occiput could be turned in front and the child delivered by forceps. The child had repeated convulsions and died forty-eight hours

⁴⁹ American Journal of Obstetrics, August, 1917.

⁵⁰ American Journal of Medical Sciences, January, 1917.

⁵¹ American Journal of Obstetrics, August, 1917.

after delivery, and an autopsy developed no cause for death except a prolonged dystocia. The mother recovered.

In another case the patient had had repair of the cervix, pelvic floor and perineum following lacerations sustained in labor. In a subsequent labor there was very slow and painful dilatation, and a shoulder presentation gradually occurred. An attempt was made to dilate the pelvic floor and perineum when the tissues suddenly split to the sphincter, with the discharge of a large amount of mucopurulent material. This had evidently been shut up in the scar tissue developing after a previous operation. The child was easily delivered by version and extraction. The lacerations were again repaired. The second patient had dystocia from scar tissue resulting from a severely torn cervix closed by operation. After a long and tedious labor she was transferred to the hospital where, under anesthesia, the cervix was incised, the head rotated and delivered by forceps. Another patient had amputation of the cervix, with anterior colporrhaphy, closure of the pelvic floor and perineum and suspension by shortening the round ligaments. After a long and difficult labor the tissues were finally dilated sufficiently by the fingers to allow version and extraction to be made.

The writer has also observed the case of a primipara who had hebosteotomy performed to permit the birth of the after-coming head. In a second labor there was spontaneous delivery. It was found that at the site of operation there was a decided mobility, which would indicate some permanent enlargement of the pelvis.

Another patient had an hebosteotomy for rickets, the child dying fifteen minutes after birth in a difficult delivery. The cervix was long, small, with multiple lacerations. No trace of the operation on the pubic joints could be found, as the bone was firmly united without exostosis. Considering the condition of the pelvis and the soft parts it was thought best to deliver the patient by abdominal operation, and this was successfully done.

As regards patients operated upon for displacement of the uterus and subsequent delivery the writer has collected the reports of 19 cases. Eleven of these had no dystocia which could be attributed to the previous operation, and were delivered normally or by a simple procedure. In the remaining 8 cases, 2 were delivered by version and extraction and 6 by abdominal Cesarean section. The details of these 6 cases are appended:

In the first there had been a vaginal suspension of the uterus; in the second, amputation of the cervix with vaginal suspension; in the third, amputation with vaginal suspension; in the fourth, a ventrofixation and suspension; in the fifth, an Olshausen suspension; in the sixth there had been an abdominal section for the removal of fibroids from the anterior wall of the uterus. This was followed by an extensive infection of the wound lasting four months, resulting in a scar through which the uterus had prolapsed and the posterior wall of the uterus was in contact with the anterior abdominal wall. After the delivery of the child it was found that the cervix was still incarcerated above the promontory and

that the lochial discharge was retained. The cervix was drawn down and the lochia allowed to escape, when the patient made a good recovery.

Chorea in Pregnancy. Flamma⁵² reports the case of a young married woman whose previous history indicated no disease of the nervous system, nor was there evidence in the history of the family of such predisposition. At twelve years the patient had an attack of nephritis; menstruation had developed normally; there was no history of syphilis; the patient was pregnant for the first time. When admitted to the hospital she had the characteristic involuntary movements of chorea. As the patient was not benefited by treatment, but grew worse, she was anesthetized and the pregnancy terminated. The puerperal period was normal, the patient finally making a satisfactory recovery. The patient again came to the hospital; on examination the general condition was good and pregnancy at about the second month was present. The examination of the urine and blood were negative. As the patient was convinced that nothing could help her but the interruption of the pregnancy, and as her movements were not sufficiently violent to justify interference, it was decided to simulate abortion. Accordingly the patient was given chloroform, the genital organs were slightly scarified, the vagina was packed with gauze and a dressing applied. The patient was convinced that abortion had been produced. A prompt recovery followed this procedure. The patient went on to term and gave birth to a living male child in good condition. The puerperal period was normal.

Bilateral Removal of the Appendages during Pregnancy. Stopen⁵³ describes the case of a patient pregnant at term who had an ovarian tumor and who was subjected to operation by abdominal section. On opening the abdomen the left ovary had been transformed into a mass as large as the greater bulk of a fetus at term, and this was situated deeply in Douglas's cul-de-sac. The right ovary was as large as a man's fist and the pathological condition present was suspicious of malignancy. Both tumors were removed without the interruption of the pregnancy. The patient subsequently came into labor and was successfully delivered of a living child.

Hemangio-endothelioblastoma in Pregnancy. Graves and Price⁵⁴ report the case of a negro who had noticed when three months pregnant a red growth behind the incisor teeth in the upper jaw at the margin of the gums. The growth grew forward between the teeth and then laterally. After the pregnancy terminated the tumor grew smaller and was finally removed with the cautery. During a subsequent pregnancy the tumor grew rapidly until the patient was delivered, when it again subsided. With each of three pregnancies the tumor increased during the pregnancy and subsided when the pregnancy was over.

Ectopic Pregnancy. THE SIMULATION OF CORPUS LUTEUM AND RETENTION CYSTS OF THE OVARY WITH ECTOPIC PREGNANCY AND EARLY UTERINE ABORTION. Rubin⁵⁵ describes a very interesting group of

⁵² Annali di Ostetricia, February, 1917.

⁵⁴ Surgery, Gynecology and Obstetrics, February, 1917.

⁵³ Ibid., 1916, No. 12.

⁵⁵ Ibid., April, 1917.

cases in which cystic degeneration of the ovary and enlargement of the uterus gave rise to a condition exactly resembling ectopic gestation on vaginal examination.

His first case had delayed menstruation followed by irregular bleeding, enlargement of the uterus, and on its right side a soft, elongated, cystic tumor freely movable but very tender. The conditions were typical of ectopic pregnancy. No curetting was done, but the patient had been closely watched for the discharge of material from the uterus, and such had not occurred.

At operation a hydrosalpinx was present, and a cystic ovary, with moderate enlargement of the uterus.

The writer describes a group of cases in which patients had lutein cysts in the ovaries which ruptured on combined examination. The tumor disappeared but the patient failed to show symptoms of shock which follow the rupture of ectopic pregnancy. Some of these patients came to operation when the condition present was discovered.

There is another condition characterized by enlargement of the uterus and delayed menstrual bleeding, with enlargement of the ovaries and tubes which exactly simulates ectopic pregnancy. In these cases a diagnosis of intra-uterine pregnancy may be made, much to the confusion of a physician when the true state of affairs is ascertained. We must believe that in some of these cases an ovum has actually been present but has been absorbed.

He also reports the case of a patient in whom the cervix was soft, darker in color than usual, the uterus softer, larger and anteverted, corresponding to at least a two months' pregnancy. On examination the uterus was retroposed. There was irregular hemorrhage, which finally ceased. There was morning nausea. A microscopic examination of the discharge from the uterus failed to show cells characteristic of pregnancy. The uterus finally contracted and the patient returned to her usual health.

The only reasonable explanation of the case is the gradual absorption of an ovum.

The second patient had been married six months and operated upon three years previously for appendicitis. Six months later she was operated upon again, with the hope of loosening adhesions, and this operation was partly successful.

Menstruation became irregular. Curetting was practised but the hemorrhage from the uterus continued. Upon examination the uterus was slightly enlarged, the right tube and ovary were thickened, as were the left, and very tender on pressure. Later on the bleeding stopped and involution took place. The patient had several attacks of this sort accompanied by gradual gain in weight. There was no distinct evidence of pregnancy nor did the patient come to operation. Other cases of similar nature are reported, and the point is made that such conditions are not infrequent and can only be definitely ascertained and properly treated by operation. When this is done, cystic enlargement of the ovaries is present, sometimes accompanied by disease of the tubes.

The writer concludes from his observations that in married women

menstruation is often delayed for varying periods. At these times the uterus changes in size and consistence, but this is often followed by what is apparently a normal menstrual flow. Occasionally a tender mass is found at one or other side of the uterus which readily suggests ectopic pregnancy. There may be pain in the lower abdomen. If these patients come to operation, cystic ovaries to greater or less extent are found. The writer believes that these cases owe their origin to abnormal action of the corpus luteum.

FULL-TERM ABDOMINAL PREGNANCY WITH MACERATED FETUS AND STREPTOCOCCUS INFECTION OF THE SAC AND UTERUS. A. B. Davis⁵⁶ reports the case of a patient, aged thirty-four years, who had previously been in good health. She had had one child normally and had nursed this child for seven months. There were no symptoms of pregnancy, but since its beginning there had been a dark mucous vaginal discharge at intervals. During pregnancy she had several attacks of nausea, vomiting and faintness. These ceased after about three months, but returned. When admitted to the hospital the patient was ill-nourished, but no considerable variation from the normal was found in the urine, pulse, temperature or respiration. The abdomen resembled that of full-term pregnancy, with considerable distention of the transverse colon. There were no uterine contractions, nor could heart sounds or placental bruit be found. The body of the fetus could be distinctly outlined, but there were no fetal movements. Vaginal examination showed the cervix high in the pelvis, readily admitting one finger, but no membranes or fetal parts or placenta could be found, nor could pressure bring the uterus sufficiently low to reveal them. Material resembling abortion came away upon the finger following examination. The blood showed moderate anemia. The abdomen became very tense. The uterus was then curetted with a large, dull curette and was found empty except for old clots and fibrin which were apparently the remains of an incomplete abortion. Upon opening the abdomen an ovoid mass, dark, dirty green in color, filled the whole abdomen and was adherent to the abdominal wall. On trying to separate the cyst from the abdominal wall it ruptured with a sound of escaping gas; dark, thin, foul-smelling fluid escaped. Cultures were taken which proved to be the Streptococcus viridans. On enlarging the sac a well-formed female fetus was found, not much decomposed, and the placenta was spread out over the right lower portion of the cavity, adherent to the surrounding tissues. The wall of this cavity was of a dark greenish color. It was washed out with salt solution, the cut edges sewed to the abdominal wound, each angle of the wound closed by suture and the cavity packed with 5 per cent. iodoform gauze. Nothing was seen of the uterus or tubes during the operation. The cavity was kept moderately packed with gauze and gradually contracted under continued pressure. Sloughing was active during convalescence, but with free irrigation of salt solution and gauze packing free drainage was established and the patient made a steady, but slow, recovery.

⁵⁶ American Journal of Obstetrics, June, 1917.

This case calls to the reviewer's mind a patient seen in consultation who had presented the usual symptoms of pregnancy for nine months. She then became toxic and had several eclamptic convulsions, which ceased. At this time fetal movements also ceased, the patient felt much better and the size of the abdomen slowly diminished. As time went on a nodular tumor could be felt in the center of the abdomen, apparently connected with the uterus, but the typical signs of normal pregnancy were absent. Various diagnoses had been made of fibroid tumor or cystic tumor, and it was thought that the original diagnosis of pregnancy had been a mistake. The patient's general health had continued good and she was able to work.

After examining her, the diagnosis of possible abdominal pregnancy was made. At operation this was found to be correct, the full-term fetus lying in the amniotic sac. The amniotic fluid had been absorbed and the limbs of the fetus had given the impression of a nodular tumor on examination. The placenta was completely adherent to the intestines. This case was treated by removing the fetus and cord, sewing the membranes to the abdominal wound and packing with gauze, with continued irrigation and packing during convalescence. The patient made a good recovery.

MULTIPLE PREGNANCY, UTERINE AND ECTOPIC. Sullivan⁵⁷ reports the case of a woman in her fourth pregnancy seized with very severe pain referring to the diaphragm. Upon examination the uterus was somewhat enlarged, the cervix elongated and external os patulous, with a serous bloody discharge. Later, a mass could be found in the posterior cul-de-sac, and at operation clotted blood and a fetus were found in the pelvis, which were removed and the bleeding tube ligated. On closer examination an intra-uterine pregnancy was also present. The patient recovered from the operation without the interruption of pregnancy and was subsequently delivered of a large, healthy child.

FULL-TERM ECTOPIC GESTATION RETAINED FOR EIGHTEEN YEARS. Peterson⁵⁸ reports the case of a woman, aged forty-six years, who had an abdominal tumor which she had carried for eighteen years. Five years after marriage there were symptoms of pregnancy and the patient's abdomen enlarged to the normal size at term. She felt life at the fifth month but not afterward. There were no labor pains, and menstruation returned. After two years the abdomen began to grow smaller and finally the patient lost weight. Upon examination, a symmetrical smooth tumor extended upward from the pubes midway between this point and the umbilicus. On opening the abdomen, the sac was found densely adherent to the parietal peritoneum, omentum and portion of the intestine. The sac contained an oily fluid and the greater portion of a fetal skeleton.

THE DANGER OF INTERRUPTING EXTRA-UTERINE PREGNANCY. D'Erchia⁵⁹ calls attention to the danger of interrupting ectopic pregnancy by any examination or manipulation, and unless the operator is pre-

⁵⁷ Journal of American Medical Association, March 17, 1917.

⁵⁸ Ibid., September 29, 1917.

⁵⁹ Annali di Ostetricia, 1916, No. 11.

pared to make a radical procedure and completely remove the tumor it should not be disturbed.

ECTOPIC PREGNANCY COMPLICATED BY PERFORATION OF THE UTERUS. Quarella⁶⁰ describes the case of a multipara who had suffered from parametritis and whose menstruation had ceased. There was a possible history of an attempt at abortion followed by uterine hemorrhage, violent abdominal pain and vomiting. The patient's menstruation did not become regular.

Upon examination, the patient still complained of abdominal pain and distention. The abdomen was asymmetrical, with a mass above the left side. The breasts were enlarged and a scanty secretion of milk was present. There was no evidence of fetal life. Under hospital treatment the patient grew somewhat better and thought that she felt fetal movements. At operation the uterus was as large as an adult fist, and there was a mass in Douglas's cul-de-sac which resembled placental tissue. In view of the adhesions present, hysterectomy was indicated and was performed. It was evident that the uterus had been perforated at the attempt to produce abortion. The fetus was removed and the patient subsequently made a good recovery.

ECTOPIC PREGNANCY WITH LIVING CHILD. Lee⁶¹ has summarized 9 reports on ectopic pregnancy in an advanced stage, at which operation was performed. His own case was that of a multipara in advanced pregnancy who had suffered much from nausea and vomiting. There had been no abdominal pain, but the abdomen had steadily enlarged. On examination, the patient was rachitic and ill-nourished, fetal movements could be seen and felt and fetal heart sounds heard in the upper left abdominal quadrant. The cervix was soft and lacerated, the external os admitted one finger, the pelvis was flattened and the urine and blood practically normal. Soon after entering the hospital, pains in the abdomen ceased and the fetus could be felt through the abdominal wall. Examination by *x*-rays showed the breech at the iliac crest with the back anterior, the fetal head under the costal arch near the stomach and the head beyond reach by palpation. At operation the fetus was lying in a thin sac anterior to the intestine and omentum; the child was delivered, the cord tied and cut. While examining to determine the location of the placenta, there was sudden severe hemorrhage. The placenta was quickly removed and a firm packing of gauze inserted. Although the patient suffered somewhat from shock, she gradually reacted. Hemorrhage, however, recurred, the patient finally dying from exhaustion.

ECTOPIC AND UTERINE PREGNANCY. Raimat⁶² quotes Neugebauer's statistics in 1913 showing 243 cases of ectopic and extra-uterine pregnancy, of which 107 were published in the eighteenth and nineteenth centuries. Weibel, in 140 ectopic pregnancies, saw 1 case combined with uterine pregnancy. Neugebauer had two in 131 cases.

The author reports a patient who apparently had an abortion for

⁶⁰ Annali di Ostetricia, 1916, No. 11.

⁶¹ Surgery, Gynecology and Obstetrics, March, 1917.

⁶² Archives de Ginecologie, Obstetrics y Pediat., 1916, xxix, 450.

which she was curetted. Some days later there was sharp pain in the left abdomen and the patient left the hospital, but summoned aid later because of pain and shock. Upon operation a large hematosalpinx was found on the left side covering the whole posterior wall of the uterus, for which hysterectomy was done. The patient recovered and the study of the case showed that there had both been ectopic and uterine pregnancy at about the same time.

INTERSTITIAL PREGNANCY WITH REPORT OF CASE. Stone⁶³ describes the case of a multipara brought to the hospital for symptoms of intra-abdominal hemorrhage. The history was that this patient had an abdominal section previously, that she supposed herself pregnant and had been greatly annoyed by pain in the right abdomen. The patient showed the symptoms of hemorrhage and there was slight discharge from the uterus.

As the patient began to improve after admission to the hospital, about thirty-six hours were occupied in waiting, and on section a hemorrhage was found proceeding from a rupture in the upper portion of the tumor. A large quantity of recent blood escaped as the tumor was turned out. A rapid hysterectomy was done, and, upon examining the specimen, the sac of the ectopic pregnancy and a uterus containing a very thin wall were found.

ABDOMINAL HEMORRHAGE OF OVARIAN ORIGIN. Novak⁶⁴ describes the case of a girl, aged fifteen years, who had symptoms suggesting acute appendicitis. She had marked pallor which was suspicious of hemorrhage. Ectopic pregnancy was suggested by the appearance of shock. Upon opening the abdomen, a large quantity of blood escaped. The right tube, however, was normal, but on the left was a small, dark-bluish nodule. This was thought to be an ectopic gestation. On again examining the right side, a cyst was discovered upon the right ovary which had ruptured and from which blood had escaped. The left ovary and appendix were normal, and, as the patient was considerably shocked, it was thought best to remove no organ from her body. The patient ultimately made a good recovery. There was no evidence of ectopic gestation on either side and the hemorrhage had evidently come from the substance of the ovary. This possibility should be kept in mind in cases where an exact diagnosis is difficult.

SOME MISTAKES IN THE DIAGNOSIS OF ECTOPIC PREGNANCY. Lytle⁶⁵ compares the diagnosis of ruptured ectopic gestation with the diagnosis of ruptured appendix. In the out-patient department of Stanford University there was 1 case of ectopic pregnancy to 131 cases of pregnancy. Uterine abortion is often confused with ectopic gestation, and also ectopic pregnancy is diagnosticated where often acute appendicitis is present. Acute indigestion, gall-bladder disease, ovarian cyst with twisted pedicle, pyosalpinx, hydrosalpinx, salpingitis and perforated ulcers have all been present in cases in which ectopic gestation was supposed to be the pathological condition. A careful review of the

⁶³ American Journal of Obstetrics, February, 1917.

⁶⁴ Journal of American Medical Association, April 21, 1917.

⁶⁵ Surgery, Gynecology and Obstetrics, June, 1917.

clinical picture present in the case with a thorough but very gentle vaginal examination should clear up the difficulty.

A CASE OF SO-CALLED ABDOMINAL PREGNANCY WITH POSTMORTEM REPORT. Cornwall⁶⁶ reports the case of a patient, from whom the specimen was removed, who died in the tuberculosis division of a large hospital. Before death nothing was noted in the report of the physical examination regarding the abdominal condition. Her friends stated that she had visited other hospitals and clinics during her pregnancy. She was unmarried and had been delivered of her first child by Cesarean section performed for eclampsia. During the early months of the second pregnancy the patient complained of abdominal pain, often so severe as to cause her to go to bed. Fetal movements gradually developed, followed by very severe abdominal pain without hemorrhage. A few days after her discharge from the hospital there was an escape of dark blood from the vagina followed by the gradual return of menstruation. The patient ceased to feel life and the abdomen grew smaller. This went on until there was no evidence of an abdominal tumor.

At autopsy the patient was extensively tuberculous. A fetus covered by a membrane and with a placenta was found in the abdomen. The amniotic liquid had been absorbed.

TRANSPLANTED ECTOPIC PREGNANCY. Wallace⁶⁷ reports the case of a woman, married five years without pregnancy, operated upon for fibroid tumor. When the abdomen was opened there was an ectopic gestation in the left tube at the outer part of the isthmus. The tube was very soft and healthy, enlarged to the size of a walnut but not distended.

The fibroid was about the size of a hen's egg and extended into the cavity of the uterus. On removing it, the incision encircled the tumor extending down and into the cavity of the uterus to the internal os. As the patient was anxious to have a child the ovum was removed from the tube and placed in the cavity of the open uterus and put into position by two sutures used in closing the uterine wound. The tube was closed and left in place. The patient made a complete recovery, went through normal pregnancy and gave spontaneous birth to a finely developed male child. This case illustrates the possibility of transplanting an ovum from the Fallopian tube to the cavity of the uterus.

THIRTY-SEVEN CASES OF ECTOPIC PREGNANCY. Echols⁶⁸ reviews his management in 37 cases of ectopic pregnancy upon whom operation was made. The most constant symptoms were localized severe pain and tenderness and persistent uterine bleeding, developing after a missed period. When there was extensive abdominal hemorrhage, nausea and vomiting developed. There was metrorrhagia in all cases.

At operation the uterus was enlarged and softened, but the enlargement was comparatively slight. Fibroids or ovarian cysts were rarely found, but chronic inflammation had sealed the fimbriated end of the opposite tubes in 8 of the quiescent cases. In 9 cases there was an effort at tubal abortion, as the gestation sac and contents had been partially

⁶⁶ Surgery, Gynecology and Obstetrics, June, 1917.

⁶⁸ Ibid., September, 1917.

⁶⁷ Ibid., May, 1917.

expelled through the free end of the tube. In the 37 cases there was no interstitial ectopic and but one pair of twins. The patients were in fair general condition and there were no deaths. Some operations were done in the houses of the patients with few facilities, and in these cases warm salt solution was poured into the peritoneal cavity just before closing. Drainage was used but once, and the necessity for it was considered doubtful. The patients remained in bed from twelve to fourteen days after operation.

In diagnosis the common mistake is to confuse an ectopic pregnancy for an incomplete abortion. A prolonged flow, accompanied by recurring pelvic pain, is strongly suggestive of ectopic pregnancy. Immediate operation is considered the only advisable treatment. It is thought that ectopic pregnancy is increasing in frequency because of cases of induced abortion and douches used to prevent conception.

Abortion. THE CAUSES OF ABORTION. Royston,⁶⁹ by statistical study of the subject, finds that more than 20 per cent., probably over 25, are induced; of these, 60 per cent. result in more or less permanent sterility. The most dangerous are those produced by the midwife, next those by the patient herself, and, finally, those produced by the physician. Nothing will deter a woman from attempting to interrupt her pregnancy when she has once made up her mind. In 25 per cent. a positive Wassermann reaction was obtained; however, less than one-third of syphilitic women gave any history or showed any physical signs indicative of the disease, and only by routine Wassermann reactions can syphilis be detected in obstetric cases. Syphilitic women abort in more than 60 per cent. of pregnancies at any and all periods.

Renal deficiency interrupts pregnancy only when the condition is sufficiently bad to produce symptoms, such as rise in blood-pressure, headaches, insomnia, vague discomfort, irritation of the bladder and a drop in the secretory power. When these indications are present, pregnancy is threatened with interruption and vigorous treatment may often be successful. Renal deficiency will produce interruption in pregnancy at any period of gestation. Although it is not an infallible index, the phthalein test is of great value. Of all women who have aborted, 65 to 90 per cent. will show some pathological lesions in the genital organs. When a state of malnutrition produces interruption in pregnancy, it is usually but a symptom of some greater underlying condition, such as syphilis, impairment of the heart, lungs or kidneys.

NOTIFICATION OF CASES OF ABORTION. Tessir⁷⁰ states that the increase in abortion, especially of criminal origin, has become so great that attention of scientific men has been turned to the possibility of lessening this menace to public health. He refers to the efforts which have been made to secure the notification to the proper authorities of all cases of abortion, both those which occur without interference and those which are produced. It is thought that the number of abortions in Paris is equal to or even greater than the number of births, and evidently but a small percentage of these are ever reported to the authori-

⁶⁹ American Journal of Obstetrics, October, 1917.

⁷⁰ Arch. men. d'Obstetrique, January, February and March, 1917.

ties. It is estimated that from 30,000 to 40,000 abortions occur each year in Paris and its surroundings and that the relative proportion of those reported to the actual number occurring is as 3 to 100.

When one seeks the reason why abortions are not reported, evidently the element of criminality in many cases leads to concealment of the occurrence.

HYDATIDIFORM MOLE. Findley⁷¹ presents a clinical analysis of 500 cases of hydatidiform mole found in the literature and in personal records. As regards the age of the patient the greater number of these cases occurred between the age of twenty-five and thirty-five and next in frequency between fifteen and twenty-five. Of the 500 cases, chorio-epithelioma developed in 131, and the ages from twenty-five to forty-five showed the largest number of cases. The occurrence of molar pregnancy does not preclude subsequent normal pregnancies. It is found that by microscopic study one cannot tell whether the given mole is malignant or not, and that the only way to ascertain this important fact lies in clinical observation. Malignant chorio-epithelioma developed in 31.4 per cent. of the 500 cases. This form of malignant disease arising from a mole displays less active malignancy than when it follows ordinary pregnancy. The recovery rate of chorio-epithelioma following hydatidiform mole is given as 47.1 per cent.; after abortion, 35.1 per cent.; and that following the termination of normal pregnancy, 33.4 per cent. The mortality of benign moles is 10.3, while of those which become malignant the death-rate is 54.5. The destructive type of hydatidiform mole is not necessarily malignant.

A positive diagnosis can be made only by seeing the vesicles. In 80 per cent. of the cases bleeding is manifest in the early part of pregnancy, and anemia is a frequent result. There is usually a constant discharge of blood and mucus; the uterus is relatively large for the time of pregnancy and this is a diagnostic sign of considerable importance. Pain is occasionally present, ascribed to the rapid increase in the size of the uterus; vomiting is present in about 15 per cent., and is ascribed to toxemia. Albuminuria is frequently found. In a few cases eclampsia has occurred early in the pregnancy. As the positive diagnosis is not made until vesicles are seen, alarm is not usually taken until too late. In malignant cases the prognosis is uncertain and must be so for many years after the discharge of the mole. The immediate dangers are sepsis and perforation of the uterus; the remote danger is malignant changes. A destructive mole may occasionally prove fatal through perforation of the uterus. In the writer's series he gives 43 per cent. developing malignant changes, with vaginal metastases in 25; pulmonary metastases in 21; cerebral metastases in 4. Of benign moles, 87 recovered and 11 died; and of 99 malignant cases, 43 recovered and 46 died. In the present state of our knowledge there is no prophylaxis known nor can one give the prognosis.

While the expectant plan of treatment was usually practised in early years, a better knowledge of the subject has brought about more radical

⁷¹ American Journal of Obstetrics, January, 1917.

procedures. In cases in which the mole is spontaneously expelled, it is wise to pass a curette over the decidual surface. The management of molar pregnancy is practically that of inevitable and incomplete abortion. When hemorrhage is protracted, and should it become excessive, the cervix should be dilated and the mole removed with the fingers or instruments. Vaginal Cesarean section may be necessary in some cases. In operative procedures there is great danger of hemorrhage, sepsis and perforation.

While some advise that hysterectomy be performed when hemorrhage is excessive and the cervix firm, the writer believes that the use of a dilating bag or incision of the cervix would be sufficient. When the patient is near the menopause, it is a wise thing to perform hysterectomy, for statistics show that 16 per cent. of moles undergo malignant changes, and but a small number of cases recover after this occurs.

Of 386 cases there was spontaneous delivery in 43.2 per cent. So far as choice of operation went, in those cases which required assistance the uterus was emptied in some manner through the vagina. Should bleeding from the uterus happen afterward in a woman who has had a mole, curretting should be at once performed and the scraping examined; if proliferating syncytial tissue is found, hysterectomy must be done. In examining patients who have had a molar pregnancy, one sometimes finds a metastatic growth containing chorionic tissue.

The writer reports the case of a primipara, aged twenty-four years, who, before admission, had a constant serosanguineous discharge; the uterus was tense, unresistant, and reached to the level of the umbilicus; the placenta was completely degenerated and there was no signs of a fetus. The mole was delivered in labor stimulated by the hydrostatic bag. The patient made an uninterrupted recovery and three months later returned because of slight bloody discharge; a nodule the size of an almond was found in the posterior wall of the vagina which was firm and dark blue in color; this was excised and found to contain proliferating syncytial cells, but no Langhans cells or villi. The uterus was subinvolved and both ovaries cystic, the size of an orange. A complete hysterectomy was performed, removing the uterus, tubes and both cystic ovaries. The uterus contained no chorionic tissue. Sixteen months after operation the patient was in good health.

TREATMENT OF SEPTIC INCOMPLETE ABORTION. Vineberg⁷² states that treatment of febrile, incomplete abortion in his hospital service has always consisted in emptying the uterus as early as possible; no bacteriological examinations were made in the ordinary cases to determine whether this was a logical procedure. The records of cases for five years were examined and there were 289 cases of either incomplete or inevitable abortion; of these there were 60 which had a temperature from 101° to 105° F.; many of these had been infected by the physician or midwife. The writer has observed that spontaneous abortion is never followed by fever, with one exception, and that is when the uterus lies in retroversion or retroflexion so that drainage cannot be successful; under

these conditions it is natural to expect fever. All of these 60 cases had been curetted or the uterine contents removed by other means as promptly as possible.

In the writer's series there were 2 deaths, one by pulmonary embolism, the other of septic pneumonia; there was 1 case of perforation of the uterus following curetting. In one case with fever for several days after curetting, a swelling in the subscapular region developed which contained pus. One patient confessed to having introduced several alum sticks into the uterus to bring on abortion; she had a severe chill and fever.

The mortality was exceedingly low, 3 per cent., and this leads the writer to believe that conservative treatment is best. In removing the contents of the uterus when the period of gestation is less than eight to ten weeks, a branch dilator was employed to open the cervix, and placental forceps used to remove the contents of the uterus. After eight to ten weeks, vaginal hysterotomy was employed. After removing all the products of the ovum, iodine solution was used to irrigate the uterine cavity; no gauze packing was employed. If there was a tendency to hemorrhage, gauze was placed against the cervix.

In preparation it is specially important that the external parts be repeatedly cleansed. The writer concludes that one of the most important features in these cases is to determine in advance whether the uterus still contains any tissue before starting active interference. In all cases if abortion having fever there has been some interference, and in many cases the uterus has already been curetted. No good, but harm, can be done by subjecting an empty septic uterus to any active disturbance.

RESTRICTION OF ABORTION. Winter⁷³ takes up the political aspects of the curtailing of the population. Before the present war the birth-rate was declining, and this was noted as a serious matter, but at present it is of great importance in connection with the enormous loss of men.

Artificial therapeutic abortion must, if possible, be discouraged. In one of the largest clinics in Europe therapeutic abortion had been practised only twelve times a year. In the author's clinic during six years, in a total of 5500 cases, he has had to perform abortion in 31 cases only. Of 202 cases sent to the clinic for therapeutic abortion, the operation was performed in but 59. In 134 patients sent to the clinic for therapeutic abortion, but 30 really required it. From this it may be inferred that at least two-thirds of therapeutic abortions performed by private physicians are unnecessary and unindicated. When the effort is made to find the causes which should lead to induced abortion, a consultation should be held with a special internist and every effort made to judge the case on purely scientific bases.

The writer recognizes the fact that 80 per cent. of abortions have their initiative from the patient herself, and this is an important factor in the occurrence of the disease.

THE CURETTE IN SEPTIC ABORTION. Polak⁷⁴ warns against the use of the curette in incomplete infected abortion. Such cases are put in bed in Fowler's position, an ice-bag over the uterus, and, if there is bleeding,

⁷³ Zentralbl. f. Gynäk., 1917, xli, 1.

⁷⁴ American Journal of Obstetrics, March, 1917.

a firm, sterile gauze pack is placed against the cervix. When a case is admitted having considerable hemorrhage, a thorough preparation is made and a culture taken from the interior of the uterus. If this is negative, the contents of the uterus are carefully removed and pituitrin given. This is done with the curette or the placental forceps or finger. The uterus is then packed with gauze soaked with tincture of iodine; this is allowed to remain for twenty minutes. The routine examination of the interior of the uterus has shown that more than 60 per cent. have staphylococci or streptococci in pure culture. In treating these cases, it is best to consider all incomplete abortions with hemorrhage as infected.

The Clinical and Medicolegal Value of Hegar's Sign. Turnu and Colistro⁷⁵ describe a case about whom they were consulted confidentially because it was thought that the birth of the child had been concealed. The patient was accused of having done away with the infant with the aid of a midwife who had previously figured in some such trial. The woman, when questioned, denied positively that she had committed the crime; she stated that there had been circumstances that might have brought on abortion. Upon examination the cervix seemed to be closed but there was a bloody and mucous discharge. The body of the uterus was anteverted and anteflexed and gave no positive signs of recent pregnancy. The physical signs were those of pregnancy of about two or three months with the characteristic Hegar sign. There was milk in the breasts. The circumstances seemed to point to an early pregnancy, perhaps with threatened abortion or one in which abortion had just taken place.

The investigation made by the court ascertained the fact that this patient, eleven days previously, had expelled a premature living child. This raises the question of the importance of Hegar's sign; of 20 cases, it was positive in 18 and negative in 2. Other statistics show that Hegar's sign is reliable in a great majority of cases.

The conclusion is reached that Hegar's sign reappears in the normal puerperal period; its disappearance about the twentieth day is a sign of normal involution. It becomes an interesting legal question how to avoid confusing the pregnant uterus with one that has recently been emptied.

LABOR.

Anesthetics and Analgesics. THE STUDY OF CHLOROFORM, ETHER AND NITROUS OXIDE-OXYGEN IN PREGNANCY AND LABOR. In the *American Journal of Obstetrics*, October, 1917, C. H. Davis contributes a paper upon his experience with these anesthetics during pregnancy and labor. He believes that each patient should be studied as an individual and that the analgesic or anesthetic agent should be chosen for the operation in view of the peculiar needs of the patient. For long operations during pregnancy or labor, ether is best. For examinations and short operations, nitrous oxide-oxygen. The fact that chloroform has considerable toxic power should lead us to avoid its use. When an

⁷⁵ Archives mensuelles d'Obstétrique, 1917.

analgesic is needed in the first stages of labor, opium alone or with chloral hydrate or scopolamine may be used. In actual labor, nitrous oxide-oxygen has proved exceedingly valuable.

NITROUS OXIDE ANALGESIA IN OBSTETRICS FROM THE STUDY OF 476 PATIENTS. Danforth⁷⁶ describes his results, the time of administration varying from a few minutes to seven hours. The gas was usually begun at the end of the first stage and in multiparæ sometimes a little earlier. The operator should keep one hand upon the fundus of the uterus that he may know when the pains begin. To be successful nitrous oxide should be given very early in the pain, if possible before the patient begins to feel uterine contractions as pain. If this rule be not observed, the administration is often not successful. The patient is urged to take deep, rapid breaths, and some patients who are accustomed to deep breathing will obtain relief from pain by only one or two deep inspirations.

Cyanosis is not necessary and should be avoided. When there is a tendency to blueness and drooping of the eyelids, it indicates that too much gas has been given. One cannot lay down a fixed rule as to the percentage of oxygen to use. From 5 to 10 per cent. is the usual mixture. As the end of labor approaches the quantity of gas is slowly increased. When there are violent pains which threaten laceration and the control of the head is difficult, ether may be added. If ether be given in small quantity and for a short time, it does not produce nausea. Patients that had been violent and struggling with pain and are given nitrous oxide-oxygen became quiet and labor proceeded normally. For operative cases ether is used, although occasionally a very easy forceps delivery may be performed under nitrous oxide-oxygen. When the child is born cyanosed the mother should be allowed to inhale oxygen for a few breaths before the umbilical cord is tied. The child will receive the oxygen almost immediately and its color will become better.

Two hundred and one cases received nitrous oxide-oxygen every five minutes to one hour, and among these the result was satisfactory in 182. In 24 cases the result was not thoroughly to be desired. One hundred and fifty-nine patients received this method of treatment for periods varying from one to two hours, and among these there were 19 which were but partly successful. In 79 cases the treatment was carried out from two to three hours; 65 were satisfactory and 14 were not. Twenty cases were given nitrous oxide-oxygen for periods varying from three to four hours. Of these, 19 were satisfactory and 1 was not. The treatment was carried out for from four to five hours in 5 cases and was entirely successful. In 2, the administration was prolonged from five to six hours, with good results. Taking all of the cases, the unsatisfactory administrations were 7.5 per cent. The longest administrations were from six to seven hours in 3 cases. As regards the children, 32 were recorded as having been born asphyxiated in greater or less degree. In some the record was made that the child was born in fair condition. There was a good reason for asphyxia besides the anesthetic in 12 cases, for forceps operation had been done in 7, breech extraction in 1, threatened eclamps-

⁷⁶ American Journal of Obstetrics, October, 1917.

sia with induction of labor in 1, and 1 child was born with spina bifida. In 1 patient there was severe toxemia of pregnancy, with extensive pathological changes in the placenta, and there was 1 case of premature labor.

Six infants were stillborn. In these there was a good and sufficient reason besides the anesthetic. As regards the possibility of nitrous oxide causing hemorrhage in the newborn, during the time when this study was made there were a number of such cases, but it could not be determined if the method of anesthetizing had anything to do with their production, nor is there evidence that nitrous oxide-oxygen produces hemolysis or hemorrhage. Regarding hemorrhage in the newborn when this method is employed, this will occur in any considerable group of cases, and there is no evidence that it is produced by this anesthetic.

Labor and the Use of Scopolamine-morphine. At a meeting of the Section of Obstetrics and Gynecology of the Royal Society of Medicine,⁷⁷ a discussion upon this subject was held by the representatives of the principal maternity hospitals in London. St. Bartholomew's Hospital reported 20 cases only. The initial dose of $\frac{1}{4}$ grain morphine, $\frac{1}{50}$ grain scopolamine was given when the cervix would admit a finger and when the pains were regular at intervals of not less than a quarter of an hour. One hour after the first dose, $\frac{1}{50}$ grain of scopolamine was given. Twenty minutes later an object with which the patient was not familiar was shown to her. The memory test alone was employed after this time. If the pains were good before the remedies were given, little effect upon the pains was observed; but if the patient had weak pains, the remedy sometimes caused them to cease entirely. In uterine inertia, then, this method of treatment is not available. The second stage was much prolonged, especially with primiparæ. The third stage was prolonged, but there was no severe postpartum bleeding. In 3 cases there was a temporary relaxation of the uterus four or five hours after delivery. Forty-five per cent. of the patients were delivered artificially, and evidently the narcosis lessened the natural expulsive forces. There was no effect on the pulse, and in 1 case only were the respirations altered. Patients complained of thirst, and in 4 nausea and vomiting were present. Some had distention of the urinary bladder. There was flushing of the face, dryness of the skin and restlessness. Analgesia was well-marked in 12, slight in 5 and absent in 3 cases. No definite relation could be traced between analgesia and amnesia. In 16 cases the fetal heart was not affected and in 4 it beat more rapidly; 19 of the children were born alive and 1 was stillborn from other causes; 8 were partially asphyxiated and most of the children were so to some extent. All the children that were born living left the hospital well. There was no evidence that the drugs were excreted in the milk. The mothers made good recoveries.

At St. Thomas's Hospital 80 cases had been treated with the usual doses except that the later doses were $\frac{1}{50}$ grain of hyoscine instead of $\frac{1}{50}$. There were 60 primiparæ and 20 multiparæ; the average patient receiving 6.5 injections. The memory test was useless, but the

⁷⁷ British Medical Journal, December 15, 1917.

behavior of the patient and whether she could feel the prick of the hypodermic needle were valuable signs. Amnesia was obtained in 45 per cent., partial in 32.5 per cent., and absent in 22.5 per cent. Analgesia was completely developed in 45 per cent., partial in 50 per cent. and absent in 5 per cent. There was no decided influence on the maternal pulse or respiration. All but 3 of the patients slept between the pains, mental confusion was often present, and restlessness, thirst, vomiting and flushing of the face were often seen. So was dilatation of the pupils. No dangerous effects were observed.

The strength and frequency of uterine contractions were diminished after the first injection, and this sometimes persisted for an hour or two, after which the pains seemed to become normal. There was a tendency to delay at the latter part of the second stage and an increased number of deliveries by forceps which was more than three times the average. Bleeding was more frequent than in normal cases; the condition of the patient after delivery was good, and there were no cases of shock. Three patients had cardiac disease, and they were helped by the treatment given. There were 3 cases of stillbirth among the children which could not be traced to the drugs employed. There was blueness in the child and asphyxia in a considerable number.

At the General Lying-In Hospital 20 cases had been treated, 19 primiparae and 1 multipara. The treatment was successful in practically half of the cases and failed in from 10 to 15 per cent. Restlessness, flushing of the face and thirst were commonly observed. There was a marked delay in labor and the use of forceps was more frequent than was ordinarily the case. There was no hemorrhage and the mother after delivery was in good condition. Ten per cent. of the infants required artificial respiration; 25 per cent. did not breathe naturally.

At Queen Charlotte's Hospital the general results were good, and success was obtained in the treatment in half the cases. In none was a second dose of morphine given and the hyoscine was repeated in accordance with the conditions in each individual case. The corneal and plantar reflexes were not of much use, and to estimate the progress of a case, considerable experience on the part of physician and nurse was necessary. Each patient demanded the constant attendance of the doctor. Mental confusion, thirst and restlessness were observed in half the cases. It could not be definitely proved that labor was greatly prolonged by the treatment. The forceps deliveries seemed to have been indicated by other conditions than the giving of the drugs. There seemed to be no tendency to hemorrhage. In one-fifth of the cases the child was partially asphyxiated at birth, but most of them recovered.

At the City of London Lying-In Hospital, 135 patients had been treated by this method, the number of injections varying from 1 to 53 with an average of 13.1. Morphine was repeated in $\frac{1}{6}$ -grain doses in 7 cases when consciousness was gradually being regained. As a rule these patients require the use of a catheter. While complete amnesia was produced in 47.4 per cent. of the cases, complete analgesia was obtained in but 8.2 per cent. Thirst, nausea and vomiting and mental confusion were often observed. In 35 per cent. there was excitement and a small

proportion of these became maniacal. In 34 per cent. the pains were subnormal and in 1 case uterine contractions ceased entirely. There was less expulsive effort than in usual cases. The second stage of labor was considerably prolonged, the number of forceps deliveries increased, tears of the perineum were greatly in excess and a greater number of cases developed lack of normal rotation of the occiput. But little is said concerning the infants except that in some cases there was disinclination to breathe, with cyanosis and limpness. There was an increased number of forceps deliveries, and it was found absolutely essential to have a doctor and nurse accustomed to the method in constant attendance upon the patient. It is evidently a method of treatment not to be used under ordinary circumstances.

In the discussion which these reports elicited, the consensus of opinion was that the method is practicable only in skilled and experienced hands. While direct mortality from this method may be small, it can only be safely used when experienced physicians and nurses are in constant attendance.

Potts⁷⁸ publishes the results of this treatment at the Birmingham Maternity Hospital. His statistics cover 60 cases, and he adds detailed reports of 8 cases in which some unusual experience is described. Among others is the case of a patient who was given repeated doses of hyoscine by the nurse and became maniacal. She was also allowed to drink water very freely. The patient was so violent that it was necessary to use chloroform to control her, but she finally gave birth to the child, and ultimately both mother and child made a good recovery. Another patient was very unpleasantly affected by the morphine and hyoscine, and the results were not satisfactory. In another the cervix was torn because expulsive efforts were exceedingly violent and it was necessary to tampon the uterus with iodoform gauze. In another, chloroform was administered because the drugs failed to secure the proper result. Another patient required chloroform and pituitrin, and in the eighth case the forceps was used. The observer concludes, as have others, that the treatment is only safe in the hands of the most experienced and with the most constant and unfailing observation.

Vivian gives the results in 50 cases in which the method was employed. These results coincide with others, showing the usual partial failure in many cases and the asphyxiation which is often seen in the child. It is interesting to note that in these cases it was considered necessary to keep the patient absolutely quiet during labor, and that after confinement the nurse must wash the infant in another room and stop the mother from conversing if possible. Why she should be prevented from remembering that she has passed through labor is a little difficult to appreciate.

The Use of Nitrous Oxide Gas in Labor. Ryder⁷⁹ has employed this method in 135 cases of labor; of these 102 were ward patients and 33 private patients. The patients were carefully watched during anesthesia, and beginning cyanosis was taken as a sign of danger. With

⁷⁸ British Medical Journal, December 8, 1917.

⁷⁹ American Journal of Obstetrics, June, 1917.

some, two masks were used, so constructed that rebreathing was possible, and in some instances the gas was administered with the help of the patient. Except for one or two private patients no oxygen was used.

The gas was given to each patient as soon as she desired it and administered almost to the end of labor. The average duration of labor was sixteen hours eight minutes, and the average second stage was one hour twenty-seven minutes; this was the time during which the patient received the gas. The longest time of administration was eleven hours forty minutes, the shortest time five minutes; ether by the drop method was found useful for seven and a half minutes on the average. The average weight of the children was 7.1 pounds and asphyxia at birth was noticed in only 6 out of the 135. There was no irregularity of the fetal heart. Marked relief from pain was more frequent in private than in ward patients, and the effect on uterine contractions was about the same in the two classes of patients.

The writer concludes that nitrous oxide gas is a safe anesthesia in childbirth, that it is easy of administration and usually successful. It is estimated that in 90 per cent. marked relief followed its use. The gas is not suitable for all patients, only a little over half, but it is especially successful with very nervous women. Its use does not predispose to postpartum hemorrhage; it does, however, slightly increase the length of labor and also the frequency with which it is necessary to use the forceps.

Painless Childbirth. Tracy and Boyd⁸⁰ present personal investigation, including the careful history of the subject of obstetric anesthesia, and translation of the official reports of the Freiburg School, and an account of methods which have been employed for this purpose. The subject is fairly and clearly presented and no effort is made to ascribe to any one method exclusive merits.

Berruti⁸¹ describes his use of what he terms *partoanalgia* in labor. This is a combination of hydrochlorate of morphine and hypophysis extract. This preparation was introduced with the hope that the extract of hypophysis would neutralize the depressing and paralyzing effect of morphine. Berruti finds that such is not the case and that in using

TYRAMIN AND MORPHINE IN CONDUCT OF LABOR. Barbour⁸² has used tyramin and morphine in the management of labor. Tyramin is an active principle of ergot, derived by bacterial action on proteins which contain tyrosin. It raises the blood-pressure and is therefore antagonized by morphine. The dose employed is 16 mg. of sulphate of morphine given hypodermically with 40 mg. of tyramin. This is given when discomfort first becomes marked in the first stage of labor. The respiration rate of the mother becomes slightly increased and remains somewhat accelerated. There has been no asphyxia in the children born in these cases. Uterine contractions become more frequent: 40 mg. of tyramin produces a temporary rise in the blood-pressure, usually amounting to 20 to 25 mm.

⁸⁰ British Medical Journal, October 19, 1917.

⁸¹ Semana médica, 1917, xxiv. 1.

⁸² Journal of the American Medical Association, September 15, 1917.

this preparation one must be careful to avoid the intoxication produced by morphine.

SCOPOLAMINE AND MORPHINE. Johnstone⁸³ has used this combination in 70 cases of labor in private practice; he has also observed its use in over 200 hospital cases. A thorough enema was given in the first stage before beginning treatment, then in a primipara he injected $\frac{1}{6}$ grain of morphine and $\frac{1}{100}$ grain of scopolamine as soon as regular strong pain occurred at seven- and ten-minute intervals and the external os had commenced to open. In a multipara he employed the same dose as soon as pains were regular and strong, and to take the place of a narcotic when necessary. The rate of stillbirths was 37.5 in a thousand, and when these statistics are applied to forceps delivery the percentage is 3.6.

LABOR TREATED BY SCOPOLAMINE-MORPHINE IN 150 CASES. Greenwood⁸⁴ was successful in producing amnesia in all but 2 cases. The time required varied greatly, in 1 case it was complete in twenty minutes, in 5 others one-half hour and in 2 not until four hours from the first injection. There were 3 cases of postpartum hemorrhage, all multiparae and all had previously had the same complication. There were no maternal deaths; 15.33 per cent. of the children showed abnormal respiration; the average time of treatment was six hours and thirty-nine minutes. So far as mothers were concerned there seemed to be a remarkable absence of exhaustion and shock; on the whole the writer's experience was favorable.

If labor was expected to last at least four hours, a second dose of scopolamine was given about forty-five to fifty minutes after the first dose, usually $\frac{1}{200}$ of a grain, but if the patient seems susceptible, $\frac{1}{100}$ of a grain, after this $\frac{1}{400}$ grain of scopolamine is given about every hour; as the head passes over the perineum a little chloroform is inhaled. It is considered absolutely essential that the patient be kept completely quiet during treatment, that the room be darkened and that the physician or nurse be constantly with her. The 70 cases included complications of albuminuria, cardiac disease and slightly contracted pelvis, 70 per cent. were primiparæ. There was one breech presentation, and in 1 case in every 4 there was posterior rotation of the occiput.

The method was successful in about 50 per cent. of the cases, multiparae usually felt much benefit from the treatment; in 2 cases the patient became so excited that chloroform had to be substituted, and in 1 case scopolamine seemed to have no effect whatever. Two of the children seemed to be disturbed by the treatment, breathed badly and required resuscitation.

The writer believes that scopolamine tends to relax the uterus, and to guard against this he injected pituitrin as soon as the placenta was expelled. After delivery the patient may be disturbed in thought and speech, but there usually is absence of shock and prostration and a sense of well-being. Hypodermic tablets of scopolamine should be employed and never solution. Morphine in the treatment should rarely be

⁸³ Practitioner, London, 98-3, 17.

⁸⁴ British Medical Journal, March 17, 1917.

repeated, because it tends to produce asphyxia in the child. The aim of the treatment is amnesia, and if this be successful the patient will have, after the birth of the child, no recollection of what preceded it.

Babies, after this treatment, are usually sleepy and quiet for twenty-four hours, and if they breathe regularly and slowly there is no danger. If cyanosed, the infant should be given a warm bath.

While it is possible to obtain good results in its use, the method is scarcely applicable to family practice, and its indiscriminate use is exceedingly dangerous.

Labor Complicated by Prolapse of the Umbilical Cord. Nordlund⁸⁵ has studied prolapse of the umbilical cord from the experience of the Stockholm Maternity Hospital. In 62,316 deliveries this complication occurred in 5.3 per cent. When the cord was replaced the fetal mortality was 30.2 per cent.; when this complication was treated by the immediate performance of version, the fetal mortality was 27.4 per cent. In these cases 38 per cent. of the infants were much below, and 32 per cent. much above, the average weight. In the total 333 cases the mortality was 30.9 per cent. In 52 of the cases prolapse followed some operative procedure and in 9 cases it was increased by intervention. In 104 the attempt was made to reduce the prolapsed cord but failed in 67, and 32 of the children died. He concludes that when the cord prolapses, extraction should follow at once with or without version. The risk of attempting to replace the cord is clearly indicated by the figures given. If the operator waits for the uterus to dilate, the patient should be kept in the Trendelenburg posture.

Labor Complicated by Injury to the Right Ureter. Vineberg⁸⁶ reports the case of a patient who had been delivered by high application of forceps, causing a deep tear in the cervix extending into the base of left broad ligament. After repair, she developed abdominal distention, and peritonitis followed. When the catheter was used, a few drops of blood came away. On passing the fingers into the rent in the base of the broad ligament there was a gush of very foul urine. The cause of the peritonitis was easily explained, as there had been infiltration into the pelvic peritoneum from the injured ureter starting up infection which ended fatally in seven days after delivery.

The second case which Vineberg studied in his service was that of a multiparous woman who had been in labor forty-eight hours and forceps applied and the dead child extracted. There was extensive laceration of the perineum which was not closed. In the first day after labor there was pain in the right lower portion of the abdomen and thigh, which became very severe and was accompanied by distention. The patient was brought to the hospital five days after the birth of a child, with the statement that she had profuse watery discharge from the vagina; it was stated that after this occurred the swelling of the abdomen disappeared. No attention was paid to this statement; the perineum was repaired and the cervix amputated and the patient apparently made a good recovery. She grew worse, however, and subse-

⁸⁵ Hygiea, Stockholm, July 31, 1917.

⁸⁶ American Journal of Obstetrics, April, 1917.

quently returned, when it was found, on examination, that there was a hard, smooth mass extending from just below the border of the rib to Poupart's ligament. This mass was moderately tender and fixed. An incision was made and an aspirating needle inserted, but no pus was found. The incision was packed with gauze, and four days later the watery vaginal discharge returned and the abdominal swelling grew less. On careful examination a small slit-like opening was found in the right lateral wall of the vagina about one inch from the entrance. On dilating it with dressing forceps, urine escaped, evidently through a ureterovaginal fistula, which became constricted from time to time, causing distention of the ureter. A cystoscopic examination showed no urine passing from the right ureteral orifice and the catheter was arrested 1 cm. from the bladder. The urine was collected from the fistula and when examined showed blood cells and albumin.

The abdomen was opened and the left ureter was found dilated and the kidney not enlarged; the ureter was then reimplanted in the bladder. The patient made an uninterrupted and complete recovery.

Labor Complicated by Posterior Rotation of the Occiput and Treated by Digital Rotation. Peck⁸⁷ draws attention to the importance of correction of posterior rotation of the occiput by digital pressure. He finds that positive diagnosis is best made at the beginning of the second stage, immediately after rupture of the membranes and during a uterine contraction. It is useless to attempt digital rotation before the vertex is engaged in the pelvis, and it is most successful when made during uterine contraction and after the occiput comes upon the pelvic floor. Rotation should be gradual, and the effort may have to be continued through several uterine contractions before the occiput remains in front. In some cases the occiput appears to be more free and movable when the uterus is relaxed, but then the fingers cannot do very well because they tend to slip off through upward displacement of the vertex. After rotation, time should be given for the remolding of the head before any effort is made to deliver artificially. Digital rotation is of use when delivery is made by forceps, and no risk to mother or child is incurred by this manipulation.

Labor Complicated by Rupture of the Posterior Wall of the Vagina and Escape of the Fetus into the Abdominal Cavity. Matthews⁸⁸ reports the case of a multipara who had very severe labor pains followed by a sudden cessation, with bleeding and expulsion of the placenta; the cord was ligated and the placenta removed, the patient being brought to the hospital between three and four hours later. On admission she was considerably shocked; the abdomen was large and pendulous, with umbilical hernia, the child, in transverse position above the umbilicus, was easily felt just beneath the abdominal wall, but there were no heart sounds. Vaginal examination showed bleeding and the protruding umbilical cord. On removing clots of blood, a large tear in the posterior wall of the vagina was discovered. Upon opening the abdomen a full-term fetus was found in the abdominal cavity lying transversely in front of

⁸⁷ American Journal of Obstetrics, March, 1917.

⁸⁸ Ibid.

the uterus; there was a very large quantity of blood, more or less clotted, in the abdomen. The dead child and blood clots were removed; the uterus was found not to be ruptured, but there was a large tear in the posterior vaginal wall through which the child had escaped into the abdominal cavity. A supravaginal hysterectomy was performed, the patient surviving the operation but a short time.

The literature shows that these cases occur in women who had borne many children, who had markedly pendulous abdomens and who had prolonged labor. Under these circumstances the fundus of the uterus drops forward, the child is directed upward and backward, and the posterior wall of the vagina is very much strained.

Repair of the Cervix after Labor. Coffey⁸⁹ is in favor of closing a lacerated cervix a few days after labor. He finds that it hastens involution, prevents backward displacement and promotes the general recovery. The approximation and healing are perfect and a scar does not form. The cervix is not painful except at the upper angle of the wound; local anesthetic by injection of novocain is sufficient and general anesthesia is rarely needed. It is very rare to find any complication accompanying the local anesthetic and at the end of six weeks the patient is usually in excellent condition. The after-treatment consists in keeping the patient in the Fowler position, with surgical cleansing of the field of operation; no douches are needed. The patient is usually convalescing in two weeks after operation.

Pregnancy and Labor following Operative Procedures on the Genital Tract. Ronsheim⁹⁰ reports several cases in which operation upon the genital tract produced difficulty in subsequent labors. He has a record of 19 cases operated upon for uterine displacement by various methods; 11 of these cases were delivered normally or by very simple procedures; 6 cases were terminated by abdominal section, of which 3 were suspension cases, 1 abdominal and 2 vaginal, and in 3 cases fixation had been employed. One of these, an especially bad condition, had been treated by curettage, amputation of the cervix, anterior colpoplasty, perineoplasty and vaginal suspension of the uterus. The resulting conditions were such that the child could not enter the pelvis and assumed the transverse position. Upon opening the abdomen the uterus was found bound down in a mass of adhesions. In another case that had been similarly treated, on opening the abdomen it was found that the uterus was partly torn loose from its fixation.

Another patient had abdominal section for removal of two fibroids from the internal wall of the uterus; this was complicated by extensive infection of the wound lasting four months. A hernia developed through the scar, through which the pregnant uterus protruded. Upon opening the abdomen the entire uterine wall was fixed by dense adhesions; the child had developed in the posterior uterine wall in an irregular breech presentation. The uterus was opened over the fetal head, forceps were applied and the baby delivered. Three hours later the patient had severe uterine contraction, with uterus distended but no lochia dis-

⁸⁹ American Journal of Obstetrics, August, 1917.

⁹⁰ Ibid.

charge. Upon vaginal examination the cervix was found above the promontory; this was drawn down and the uterus emptied itself; the patient made a good recovery.

Immediate Repair of Injuries of the Perineum. Pool⁹¹ has found success in the immediate repair of lacerations produced during labor. A thorough examination should be made and should there be tendency to hemorrhage, pituitrin may be given, silk sutures may be placed at the vulvovaginal edge of the wound to draw the tissues apart, and this can be held by unskilled assistants. In cases in which the levator muscle has been separated from its bony attachments the best light and ample assistants are necessary; but when the injuries are lower down they can be readily repaired. Even complete laceration of the perineum can be immediately closed with great benefit. In cases in which median perineotomy has been used, the wound should be closed as soon as labor is over. The writer believes that all injuries should be repaired within at least twenty-four hours after their occurrence.

The reviewer has had excellent success in the closure of lacerations within twenty-four hours after labor, including those of the cervix. While it is absolutely necessary to check hemorrhage from the cervix by immediate suture, it is of great advantage to close all considerable cervical lacerations as soon as possible.

Posterior Rotation of the Occiput Complicating Labor Treated by Scopolamine and Manual Rotation. Cary⁹² reports the case of a woman, aged twenty years, a primipara, in whose case the membranes had ruptured without previous pain; the patient had a tedious labor, with loss of sleep and nagging pains, the cervix very gradually becoming obliterated. She became hysterical and was transferred to the hospital; scopolamine was used and anesthesia was employed, and a left occipitoposterior position was changed to the right occipitoposterior position by performing rotary version. Three hours later the patient had brought the head to the pelvic floor and a simple forceps delivery was possible; there was no injury, and mother and child made a good recovery.

Double Uterus Complicating Labor. MacNaughton⁹³ had the opportunity to observe 2 cases of double uterus complicating pregnancy.

His first case had two cervices, each admitting one finger; there was placental tissue in the vagina and within the cervix, with considerable hemorrhage. The fetal membranes were not ruptured and the head had not engaged. The patient had been repeatedly examined, and it was thought best to deliver by abdominal section. Upon opening the abdomen there were two distinct uteri united only at their cervices, the left uterus was pregnant about six months, the right about four. The uteri were emptied and the incisions closed by suture. The patient made a good recovery.

In the second case the uterus appeared on the left side of the abdomen, reaching almost to the ensiform cartilage; there were two vaginae about equal in size. On section the two distinct uteri were united at the cervices, each having one tube and ovary; the left uterus was pregnant

⁹¹ American Journal of Obstetrics, July, 1917.

⁹² Ibid., June, 1917.

⁹³ Ibid., May, 1917.

nine months; the right was studded with fibroids. The child was removed from the left uterus and the tissue closed in the usual manner; a small fibroid was also removed. The right uterus was removed by hysterectomy. The mother and child made an uneventful recovery.

The writer had collected 26 cases in which there were 55 pregnancies, 76 per cent. of which resulted in a living or viable child, 23 per cent. aborted; in 18 per cent. operation was necessary. It is interesting to note that a double uterus rarely becomes the seat of a double pregnancy.

An important aid in the diagnosis is the vaginal septum which accompanies the condition in 67 per cent. of the cases.

The reviewer recently had occasion to operate upon a patient from whom one-half of a double uterus had been removed; the remaining uterus was thin-walled, ill-developed and resembled a membranous sac; operation was done before the membranes had ruptured. There were some adhesions following the first operation.

In view of the extreme thinness of the uterine wall and the danger of rupture in subsequent pregnancies, supravaginal hysterectomy was performed.

Labor followed by the Birth of Five Children. Martin⁹⁴ was called to a patient, eight months pregnant, a multipara. The abdomen was very large and nothing could be detected by palpation, and the patient was unable to lie flat upon the back because of the difficulty in breathing. Labor came on spontaneously; the os was three-quarters dilated and the membranes unruptured. He ruptured them, and the first child, a male, was born with normal presentation and position. After a pause of about five minutes, labor pains began and a second bag of water was found presenting; on rupture a second child, in cephalic presentation was delivered; after an interval of twenty minutes labor pain again started, a third bag of water presented and upon rupture another child was presented by the feet; the fourth child had normal presentation and position and also the fifth. After about a quarter of an hour the placenta was expressed without difficulty; it was one large placental mass with five separate sacs. The first 4 children were males; they were all alive at birth (about eight to twelve inches in length), and lived for periods varying from half an hour up to twenty-eight hours. There was no facility for weighing them.

The amount of liquor amnii was very large, there being over three-quarters of a bucket full. The mother had a normal puerperal period without tendency to hemorrhage.

The Conduct of the Third Stage of Labor. Gibson⁹⁵ draws attention to the importance of proper management of the third stage of labor. He finds that harm is often done by massage and kneading the uterus. The writer believes that even the Crédé method is at times injurious because the temptation is to apply it too early.

His own method consists of ascertaining the height and form of the uterus by inspecting the abdomen. From the time of delivery the patient is carefully watched for signs of hemorrhage, and the uterus is

⁹⁴ British Medical Journal, March 17, 1917.

⁹⁵ Surgery, Gynecology and Obstetrics, May, 1917.

promptly massaged if it relaxes. Upon the delivery of the child a tape ligator is passed about the cord and is left where it can be very plainly seen. When the placenta is detached, simple expression is used and the placenta is slowly and very carefully delivered. He is very cautious to disturb the uterus as little as possible and gives plenty of time for plugging of the uterine sinuses.

Episiotomy. Levitt⁹⁶ advances a plea for the use of episiotomy to prevent lacerations. It may very readily be abused, but when controlled by good judgment it is a valuable treatment. In repairing episiotomy wounds he passes his first stitch so that it embraces the wound at its base, bringing together the constrictor vaginae and the transversus perinei muscles. The needle is entered at a point on the vulva just above where the scissors began to cut when the section was made; it is then passed obliquely upward in the direction of the other edge of the vulva, coming out on a point on its surface corresponding to the one where it entered; thus the tissue which was first to give way under the scissors blades are brought together; the stitch may or may not be tied immediately. As soon as the first deep stitch is placed a loose knot is tied in it, a clamp fixed at its ends and the clamp handed to the assistant, while he makes gentle traction toward the patient's opposite thigh. Three or four catgut stitches are put in this direction, and the direction is then reversed and the vaginal surfaces similarly united.

Management of Labor in Borderline Contractions of the Pelvis. Polack and Phelan⁹⁷ believe that in these cases accurate pelvimetry is absolutely essential, and to this must be added the relative estimation of the size of the fetus. Every borderline case should have this conducted in a hospital under the most scrupulous asepsis. Examination should be made through the rectum and no vaginal examination should be made unless for the ultimate decision. This should be done with the patient anesthetized, and strict surgical technic should be observed. In 80 per cent. of borderline pelvis the patient will deliver herself spontaneously. Pubiotomy is safe in multiparæ with flat pelvis, 7.5 cm. or over, or in justominor contractions with internal conjugate of over 8.5 cm. and in primiparæ with funnel pelvis. The Doederlein is the simplest and safest method. Extraperitoneal section should be selected when labor has been prolonged and the membranes have been ruptured a long time.

The classic operation is best for elective cases.

Rupture of the Uterus. Scott⁹⁸ reports 4 cases of rupture of the uterus occurring at the Toronto General Hospital. There were among 3973 patients delivered in the obstetric wards 3 cases of rupture of the uterus; in the next 2500 deliveries there were 2 ruptures.

Among the 3973 patients rupture occurred spontaneously but once. Various other clinics give the frequency of rupture as about 1 in 1000. Of the 6 cases ruptured, 2 followed the performance of version in the hospital, 1 after manual dilatation and forceps and version outside the hospital, another followed a long labor and attempt at high forceps

⁹⁶ Lancet, 1917, 37-31.

⁹⁷ Surgery, Gynecology and Obstetrics, March, 1917.

⁹⁸ American Journal of Obstetrics, September, 1917.

outside the hospital, while 2 were spontaneous, occurring early in labor, 1 in the hospital and 1 outside. It is recognized that rupture may occur during pregnancy; in these cases there is either some pathological condition of the uterine muscle; this may be the scar of a former Cesarean section or external traumatism during pregnancy, such as a fall or direct injury to the abdomen. Placenta previa may be a predisposing factor, especially if an effort be made to forcibly dilate the uterus. A retroverted uterus may rupture spontaneously and the rupture may not be detected until the uterus begins to contract or some steps are taken to empty it.

In labor rupture may be traumatic or spontaneous, and repeated spontaneous rupture has been observed in 28 cases. The scar from a Cesarean operation may rupture as early as the thirtieth week in pregnancy.

A traumatic rupture, or that produced by version, is most common, and next come those cases in which forceps have been used without judgment or skill and with improper application. Pelvic abnormality is an important factor in a large percentage of spontaneous rupture.

Protracted labor, pendulous abdomen, overdistention of the uterus, the rising of the obliquely directed contraction ring toward the umbilicus and tension on the round ligaments between pains are signs of impending rupture. The pulse rate becomes somewhat increased and there is a slight rise of temperature, especially just before complete rupture occurs. When this happens, pain ceases and the patient goes into a condition of shock, with rapid, low-tension pulse, subnormal temperature, drawn, white face and distention of the abdomen.

There is an insidious type of rupture, which develops very slowly, in which a pathological condition of the uterine muscle, either from fatty degeneration or red necrosis, may be present.

A peculiar case is reported by Elliott, who was called to a patient in labor, and found the fetal head at the vulva and no uterine contractions; when the child was delivered by forceps, rigor mortis was present, to which uterine rupture was ascribed. In another case reported rupture was due to retroperitoneal pelvic tumor. So far as treatment is concerned the majority of opinion is distinctly in favor of operation at the earliest possible moment. The mortality rate of those treated without operation is stated as 80 per cent.; when operation is performed promptly and skilfully, the recovery rate is 32 per cent. in 754 cases.

Among the cases reported is, first, that of a multipara with fat, pendulous abdomen in whom conditions were such that an accurate diagnosis by palpation could not be made. She evidently went four weeks past term and had premature rupture of the membranes. The diagnosis was made of posterior rotation of the occiput on the right side; the occiput was drawn to the front and forceps applied, but delivery could not be effected, for a firm contraction ring was preventing delivery. Although the child was alive it was thought best not to deliver by section, and version was performed with difficulty and a stillborn child delivered. On attempting to remove the placenta, a large, complete rupture was found in the posterior wall of the uterus, with the intestines in the uterine cavity.

The patient died of shock within a short time. At autopsy, the uterus was found firmly contracted, no intestines in the opening and very little hemorrhage in the peritoneum.

The second case was a primipara, in labor forty-eight hours, in which time manual dilatation and an attempt to apply forceps was made by her physician. On attempting version a rupture was discovered on the right side of the uterus between the layers of the broad ligament. Cesarean section was immediately done, followed by total hysterectomy and drainage from above and below. The patient recovered. Microscopic study of the uterine wall revealed no degenerative change. The third case was a multipara who had three deliveries by forceps and whose labor began in her own home. She was given morphine by the attending physician and slept; she awoke with sharp pain and some vaginal bleeding. The patient refused to go to the hospital. The abdomen gradually became distended, rigid and tender. The pulse was rapid and the temperature was 99.8° F., with some vomiting. Labor pains did not develop. The cervix was nearly dilated and a ragged tear could be felt in the right side of the uterus; the head was presenting above the brim and could be reached with difficulty. Upon examination under an anesthetic there was no obstacle to labor and the patient was delivered by version without difficulty. Abdominal section was done at once and a complete tear of the uterus found extending from the internal os, through the broad ligament, to near the fundus on the left side; there was bleeding from the ovarian artery and much blood had accumulated in the abdomen. The uterus was extirpated and the cellular tissue treated by drainage and by packing through the vagina. The patient ultimately died of septic infection.

The fourth case was admitted after rupture of the uterus had occurred and was treated immediately by section, many clots and much blood being found in the abdomen. The child was removed but the heart beat but a few moments. Rupture of the vault of the vagina up to the left side of the uterus for about three inches was present, then through the posterior layer of the broad ligament. Complete hysterectomy with drainage failed to save the patient.

The fifth case was that of a patient in labor with regular but not strong pains. The patient showed signs of collapse, and on abdominal section the right broad ligament was found enormously distended with blood; rupture had taken place on the right side of the uterus between the layers of the broad ligament; a dead child was removed by Cesarean operation. Supravaginal hysterectomy was performed and infection developed from which the patient made a complete but tedious recovery.

The sixth case was one in which rupture occurred during version and difficult extraction of a good-sized child. There was no sign of shock and abdominal section was performed. A complete rupture of the left side of the uterus, confined to its lower segment, was found. There was little hemorrhage in the abdominal cavity. Hysterectomy was performed, with drainage above and below, the patient making a good recovery.

Kahle⁹⁹ reports the case of a patient who had a miscarriage at three months, as hemorrhage persisted after the expulsion of the fetus, the abdomen was opened, the uterus was incised and the placenta removed; the patient recovered promptly. Eighteen months afterward she came to labor at full term; the pelvic measurements were ample but the patient was advised to enter a hospital for confinement, but declined to do so. The patient's labor pains were irregular and weak for about forty-eight hours, after which they ceased. Rupture of the uterine scar was suspected; there were no fetal heart sounds; the stomach was dilated; the pulse was rapid but of good volume; profound shock was absent; the patient said she felt well but that she thought she had heard something crack and felt something give way in the abdomen. She was removed to the hospital, and on section a dead child was found in the peritoneal cavity; hysterectomy was done and the patient stimulated by intravenous injection of saline solution.

On examination of the uterus it had ruptured at the scar, which contained no muscular tissue, the endometrium approximating the peritoneum.

THE TREATMENT OF RUPTURE OF THE UTERUS DURING DELIVERY. Mazzi¹⁰⁰ has seen 5 cases of rupture of the uterus during delivery. The treatment employed consists in bringing down the upper lip of the rupture inside, and well past the lower lip, then keeping up traction on the upper lip by the forceps in place of the hand. Gauze is then packed around the forceps in the lower portion of the uterus, distending it and the vagina thoroughly. The upper lip of the lacerated surface is drawn down by several pairs of forceps, a drainage tube inserted, the forceps and tube being kept in place by a packing of gauze in the vagina. The bladder was constantly drained by a retention catheter. A tampon is introduced through the cervix and vagina and allowed to remain for seventy-two hours, then the forceps, drainage tube and tampon are removed, and the after-treatment is usually that given to puerperal patients. Eighty per cent. of the patients did well.

RECOVERY AFTER RUPTURE OF THE UTERUS. Rigdon¹⁰¹ describes the case of a patient who had been under the care of a midwife in prolonged labor; the os was fully dilated and the membranes unruptured, with the head and the umbilical cord presenting.

The membranes were ruptured and the cord immediately prolapsed; no pulsations could be felt; the head was above the brim of the pelvis in the anteroposterior position. Internal version was performed, but the head could not be brought through, and the body was severed from the head, leaving the head in the uterus. While the midwife held it firmly at the pelvic brim the head was perforated and extracted with the cranioclast. On examination an annular rupture of the uterus, extending completely around the junction of the cervix with the vagina, except for a thin partition, was found. The placenta escaped into the abdominal cavity. The uterus was grasped with a pair of craniotomy forceps and directed down through the vagina and the

⁹⁹ Journal of American Medical Association, December 29, 1917.

¹⁰⁰ Ibid., November 10, 1917.

¹⁰¹ British Medical Journal, September 1, 1917.

remaining attachments of the uterus were ligated as high up as possible and the uterus completely separated. The patient's pulse became bad but there was no hemorrhage, and the nearest hospital was fourteen miles away and too far to permit the ready transfer of the patient. On the following day her condition was better and the abdomen was opened in the middle line below the umbilicus, a moderate amount of blood clots were removed from the pelvis but there had been no recent hemorrhage. The placenta was near the splenic flexure. A gauze drain was placed in the pelvis and abdomen quickly closed. A week later the discharge had become purulent and the patient was transferred to a general hospital, where she was treated with antiseptic douches. She was discharged five weeks after this, with the wound perfectly closed.

This patient had been married four years and had two previous pregnancies, the first premature, with expulsion of a stillborn fetus at eight months, the second she had aborted at the seventh week.

RUPTURE OF THE UTERUS AFTER THE USE OF PITUITRIN. Grosvenor¹⁰² describes the case of a healthy primipara, aged twenty years, seen in consultation, in which rupture of the uterus followed the use of pituitrin, the case being one of occipitoposterior position, with the head firmly engaged but without descent. The cervix was moderately well dilated but no retraction, and four drops of a preparation of pituitrin were given hypodermically; thirty-five minutes after the first dose of pituitrin, the second, of five and a half drops, was administered. In the second pain after the second injection of pituitrin the woman collapsed and it was found that the uterus had ruptured and that the body of the child was perfectly mobile in the abdomen. The abdomen was opened and the child extracted, but the mother died within two or three minutes after. The rupture extended from the top of the fundus on the left side posterior to the uteroovarian ligament, went down the uterus through the cervix into the vagina and up the left broad ligament to the brim of the pelvis.

PUERPERAL PERIOD.

Occurrence of Tuberclle Bacilli in Breast Milk of Tuberculous Women. Wang and Coonley¹⁰³ have studied this subject at Seaview Hospital for one and a half years. The breast milk of 28 tuberculous women was examined for tubercle bacilli. Some of the women gave birth to the children in this hospital and others entered the hospital after the birth of the children. Specimens of milk were obtained twice each week by massage of the breasts under aseptic precautions, the specimens being examined within two hours after they were withdrawn from the breasts. The plain smear was first examined for tubercle bacilli, the remainder of the specimen was treated with weak antiformin solution and the resulting sediment examined for tubercle bacilli. Sediment from each of the last 15 of the series was injected into guinea-pigs and the guinea-pigs killed six weeks later and examined for tuberculous changes.

¹⁰² Surgery, Gynecology and Obstetrics, August, 1917.

¹⁰³ Journal of American Medical Association, August 18, 1917.

Of the 28 women 12 had moderately advanced uncomplicated tubercular infection, 1 had orthopedic complications, in 2 cases the disease was complicated by tubercular laryngitis, 9 far advanced and uncomplicated and 4 far advanced and complicated by tubercular laryngitis. The age varied from nineteen to forty years; tuberculous manifestations varied from chronic indolent fibroid to the rapid fulminating miliary types. One-half improved somewhat during their stay in the hospital, 4 died within a month after delivery and the remaining 10 showed no improvement. Most of the group were multiparae. There was no suspicion of mammary disease in any.

When the guinea-pigs treated by injection were killed, the examination showed no effect of any kind produced by the injection. There were 450 microscopic examinations made from the whole series; all were negative except one which was positive once and one other specimen from the same case was suspicious once. This was a case with tuberculous bones in both wrists which were progressing very well. She insisted on nursing her child, and nursed it regularly for about seven months; the child is now over one and a half years of age and seems healthy and well-developed, and has never been sick.

Specimens of milk were taken during all periods of activity of the breasts both before and after childbirth. In one case specimens were obtained regularly for eighty-eight days before labor and another one for a year after labor. Colostrum was frequently examined and twice injected into guinea-pigs.

Observations were also made on two guinea-pigs that were fed breast milk from two tuberculous women. The milk from these women was fed to the animals three times daily for one month. As much milk as possible for each feeding, the amount varying from 10 to 40 c.c.; with the milk a small amount of lettuce and bread was fed. The animals both lost weight at the end of thirty days of the feeding; both were subsequently killed and no trace of tuberculosis was found in either animal.

The results of these studies are negative, with one exception, which was questionable. This observation would indicate that tubercle bacilli are infrequently found in breast milk of tuberculous women who have no mammary disease.

The Effect of Various Sorts of Protein in the Diet on the Production of Human Milk. Hoobler¹⁰⁴ has studied this question in healthy nursing women. He finds that the nutritive ratio of 1 to 6 seems best adapted to nursing women. This ratio refers to the proportion of digestible protein to fat and carbohydrate, the latter reduced to a carbohydrate basis. Animal protein is more suitable than vegetable protein in supplying nitrogen for the milk and maintenance of nitrogen balance. The protein derived from nuts fed with other vegetable protein is suitable for supplying milk protein and for maintaining nitrogen equilibrium. A diet composed exclusively of cereals, fruits and vegetables does not supply sufficient protein for elaborating milk protein and causes a severe drain on the tissues of the mother. Of the various forms of animal protein, that which

¹⁰⁴ American Journal of Diseases of Children, August, 1917, vol. xiv, No. 2.

is derived from cows' milk seems particularly suited for the production of human milk and for the preservation of maternal tissue.

Puerperal Period Complicated by Phlebitis of the Inferior Vena Cava. Megia¹⁰⁵ reports the case of a young and otherwise healthy woman who had phlebitis of the left femoral vein at the birth of her fourth child; when the fifth was born there was femoral phlebitis first on one side and then on the other. After both had subsided there suddenly developed chills and prostration, with intense tenderness and acute pain in the right iliac fossa; the pain gradually spread along the spine and thorax, any touch or movement causing agony. After two weeks of suffering the fever subsided and recovery slowly followed, the anemia and asthenia persisting for a long time. Phlebitis of the inferior vena cava seems the most rational explanation.

Filiform Drainage in Puerperal Mastitis. Agnese¹⁰⁶ has used a drainage by thread in puerperal mastitis; the threads are entirely drawn through the abscess and drainage proceeds incessantly and effectually. The minute opening in sound tissue not filling up, while they do not favor the introduction of air, are not painful and do not bleed. Two cases of mastitis were specially interesting; in the first, silver wire, about 0.5 cm. in diameter, was passed through the entire extent of the abscess and a second wire was introduced later. The dressings were constantly soaked with pus and were changed twice daily; relief was prompt and healing soon followed without damage from the incision, and the woman was able to nurse her child early. The other breast became affected a week or two later and a bronze wire was passed through the lesion, with similar prompt recovery. In the first breast infiltration persisted after suppuration had ceased and the wire was left in place for nineteen days for this reason. In the other breast this persisting infiltration was disregarded and the wire was withdrawn on the ninth day, with equally prompt complete recovery.

In the second case silkworm gut was used, and this is thought better for the purpose. An extremely long needle had to be used, as the distance through the breast was so great. A mattress needle was used in one case.

Vesicovaginal Fistula. TREATMENT OF INOPERABLE VESICOVAGINAL FISTULA. Peterson¹⁰⁷ describes the case of a patient, aged thirty-eight years, who had been severely injured by forceps delivery in her sixth pregnancy.

The upper part of the vagina was completely shut off by adhesions, with no trace of the cervix. An attempt to loosen the bladder wall about the vesical opening failed and it was necessary to make a rectovaginal fistula just above the internal sphincter; the patient thus emptied both the bladder and bowels through the rectum. She recovered completely from the operation and subsequently menstruated in the same manner.

Peterson has collected from the literature 40 cases of fistula which could not be closed and in which it was necessary to completely close

¹⁰⁵ Revista clinica, March 1, 1918.

¹⁰⁶ Polyclinico, July 15, 1917.

¹⁰⁷ Surgery, Gynecology and Obstetrics, October, 1917.

the vulva, and later the bladder emptied through the rectum. The injuries which make this necessary are almost invariably the result of badly managed cases of labor. In one, a very severe typhoid fever was followed by extensive sloughing and the production of this condition. In some there was vesicovaginal fistula, and, in some, complete destruction of the urethra. In malignant disease this procedure may be necessary after the radical operation for removal of cancer. As the operation is performed without opening the peritoneal cavity, the mortality rate should be very low from septic infection. Pneumonia and nephritis are among the fatal complications, but these are common risks from other surgical procedures.

It is interesting to note that discharge of urine into the rectum does not produce irritation; fecal matter is softened, but there is no uncomfortable diarrhea, and in 5 cases the patient was reported as constipated. In some cases menstruation ceased after the operation and in others the discharge passed through the rectum.

THE OPERATIVE TREATMENT OF INACCESSIBLE VESICOVAGINAL FISTULA. Ware¹⁰³ gives the results of his experience in the report of 5 cases. He finds that Schuchardt's incision gives the best access to the vaginal vault. This incision, however, should not be confused with ordinary straight lateral incision in colpoperinection. This operation is a distinct advance in the resources of operative gynecology. It is necessary to freely mobilize the bladder in the treatment of these complicated cases, and this may most easily be obtained by first finding the plane of cleavage between the injured tissues about the fistula. It is a decided help in performing the operation to force down the bladder injury, bringing it within reach by introducing a sound into the bladder. In placing the sutures, care should be exercised that they are inserted into the bladder and vaginal wall in such a way that a line of sutures are not superimposed.

SPONTANEOUS REPAIR IN OPERATIVE VESICOVAGINAL FISTULA. Frank¹⁰⁹ has studied the subject of spontaneous healing of vesicovaginal fistula. He has collected from the literature 19 cases and finds in cases of injury to the bladder occurring during labor which heal spontaneously that neither the size nor the situation of the defect is of as much importance as the fact that in the former the bladder is free to contract and the broad tissue planes are mobilized.

In operating the bladder should be freely liberated in every case before an attempt is made to close the fistula. When the bladder sphincter is completely destroyed an effort to construct a new urethra is unsatisfactory. After repair of the defect the uterus may be interposed into vesicovaginal septum to restore continence.

The method of approach in each case must be chosen in view of the circumstances of the case. When the latter develops after operation, a permanent catheter must be used much longer than is customary, as healing may still take place as late as the fourth week. If the bladder be fully freed, diverticula cannot escape notice. Spontaneous healing

¹⁰⁸ Surgery, Gynecology and Obstetrics, August, 1917.

¹⁰⁹ Ibid.

of vesical injuries takes place most rapidly when the bladder is fully mobilized and the tissue planes are given an opportunity to glide one upon the other. Spontaneous repair is assisted by getting the bladder to contract, and this can be done by the use of a permanent catheter. The suture of the bladder is really of secondary importance.

The Hygiene of Nursing Mothers. Kettner¹¹⁰ believes that nursing women should not be restricted but that they should follow their usual lives and eat and drink what has usually agreed with them. At first it may be advisable, while in the pregnant condition, to take smaller and more frequent meals, but after the birth of the child ordinary meals may be resumed. A nursing mother should take considerable exercise, particularly in the open air, while light sports and gardening are specially valuable. About a quart and a half of fluid should be taken daily, including a quart of milk, the rest in pure water. During the summer, water should be taken more freely by mother and children.

After delivery there are certain conditions which tend to favor constipation. It must be remembered that purgatives check, or arrest entirely, the work of the mammary glands. A dose of castor oil or other purge may tend to turn the scale against the normal development of lactation. This is specially likely to happen with the first child and oftentimes an attempt is made upon this basis to avoid nursing the infant. When this occurs at the first childbirth the woman is liable to believe that she is unable to nurse any of her later children. The bowels can be moved with enema, for purgatives interfere with the development of the mammary gland function, which may have begun days before delivery. Chronic constipation should be overcome by mechanical means.

The writer is also in favor of establishing at various infant hospitals courses of instruction for young girls in the care of babies.

He believes that great care should be taken in preparing nipples for nursing, as improper cleansing and non-use render them soft. Air and water are what are required. The clothing should be loose over the breasts and they should be given an air bath during the day, and several times during the day the whole breast should be doused with cold water. If the nipples are particularly tender, a little alcohol may be used to harden them.

As soon as there is smarting, indicating a crack in the nipple, it should be treated with alcohol or touched with silver nitrate. The child must be allowed to nurse the nipple even though it does hurt. Nipple shields can be used, each breast must be emptied completely as the child nurses, and the mother should be persuaded to give each breast in turn to the child as usual. By this method and the cold water treatment patients are often able to nurse children even through a mild attack of mastitis.

Promotion of Lactation. Ernberg¹¹¹ believes that in the care of the newborn, prophylaxis is of the greatest importance. The aim of this should be to develop the breasts and bring about a condition in which

¹¹⁰ Medizinische Klinik, October 29, 1916.

¹¹¹ Hygiea, Stockholm, 1917, vol. lxxviii, No. 21.

milk ducts might easily permit a free flow of milk. When there is not sufficient mother's milk during the first five or six days it is probably because the nipples or milk passages are not fully developed. The amount of milk is also likely to grow less during the third or fourth week, possibly because the woman is resuming her usual household work. The best stimulant for the secretion of milk is the sucking of the child. If the mother's own child does not do this vigorously the suggestion is made of allowing another baby to nurse at the same time or at alternating intervals. Such patients are often best in hospitals. With perseverance success can often be obtained by this method and lactation finally established abundantly.

Sometimes lactation can be saved by allowing the child to use the bottle for a short time, then returning to mother's nourishment. Much can be done by supplying the mother freely with proper diet and by having the child nurse frequently.

Puerperal Septicemia. Krusen¹¹² makes a statistical study of the subject based upon the reports from the various cities and counties in the United States. It is stated that at present while regulated hospitals have a mortality of puerperal infection of less than 0.25 per cent. in the United States, 45 per cent. of deaths among parturient women result from puerperal septicemia; this would give 7000 as dying in the year 1913 in the United States from puerperal sepsis. So far as can be determined, death-rates in this country show no decrease. When one compares the mortality in cities and in the country it is difficult to make an accurate computation, but apparently conditions are better in rural districts than in cities. In the large cities of the country the death-rate is not decreasing; there is an exception, however, in New York, where a definite and steady decline has been observed; Boston, Buffalo, Detroit, Jersey City and Washington show annual fluctuations but remain in general about the same. Newark, N. J., shows a great tendency to increase. In Philadelphia, in 1916, the mortality per 100,000 for married women was 40.4 per cent.

Judd¹¹³ reports the study of 100 cases of sepsis, 52 after labor and 48 after operation. Of the postpartum cases, 34 were after spontaneous delivery, in 16 forceps had been used, and in 2 version had been performed. In dividing the cases the writer places in one class toxemias, including sapremia and all cases with definite lesions without bacteremia. In the second class he includes septicemia, subdivided into bacteremia and pyemia.

There were 93 toxemias of varying degree of severity, 6 bacteremias and 1 pyemia. So far as mortality is concerned, there were 7 deaths, which is 7 per cent.; 5 of these deaths were after labor and 2 were after operation; of the 5 deaths occurring after labor, blood culture was negative in 2, peritonitis being the fatal cause in 1, and in the other lobar pneumonia. Of the 3 cases in whom blood culture was positive, 1 had bacteremia and pyemia, and the other bacteremia only, and in a postoperative case the blood culture was positive, 1 case of bacteremia with streptococci

¹¹² American Journal of Obstetrics, October, 1917.

¹¹³ Surgery, Gynecology and Obstetrics, March, 1917.

recovered. The average stay of these patients in the hospital was twenty-five days; so far as treatment was concerned, all patients of this sort should go to the hospital and examination should be made to find, if possible, the focus of infection. A pelvic examination should be treated as an operation and conducted as carefully as possible. All local lesions should be carefully recognized and treated. Portions of retained membrane and placenta should be removed with the gloved finger or with placenta forceps. If the patient has severe bleeding, it should be stopped by a vaginal pack. Douches and the use of curettes are to be forbidden.

The important part of the treatment of sepsis lies in increasing the resisting power of the patient's tissues; for this purpose fresh air and abundant and concentrated nourishment are most important. When abscess develops it must be opened and drained; when pelvic exudates break down into abscess, in addition to drainage, vaccines are useful, especially when there is long-continued discharge. It is well to avoid irritation of the bowels by daily cathartics. Gellhorn's method of applying heat is considered excellent in chronic cases, with much exudate. When sepsis persists, bitter tonics, with iron and arsenic, are useful.

TREATMENT OF Puerperal Pyemia by LIGATION AND EXCISION OF THE PELVIC VEINS. Miller¹¹⁴ has collected the literature upon the subject and has divided the cases into groups and given the mortality of each group. In his study 197 cases are included, of which 15 were treated by extraperitoneal and 182 by transperitoneal operation. The gross mortality was 51.6 per cent., but the corrected mortality was 33.9 per cent. The indications for the operation are thrombosis of the pelvic veins following operation or labor and the development of severe pyemia.

In making the diagnosis, some observers believe that they can palpate the veins distinctly, others question this, but say that symptoms indicating pyemia give rise to a strong suspicion that pelvic veins are thrombosed. Most clinicians observe an absence of pain and the fact that the broad ligaments are not fixed as in cases of cellulitis and exudate. Blood examinations have proved of little value except as a factor in the prognosis. In the majority of the cases the thrombi are in the spermatic veins, occasionally in the hypogastric or common iliac. The majority of operators would proceed with the operation as soon as they can find the veins by palpation. Cases of chronic pyemia yield the largest percentage of recoveries.

In choosing the time for operation, the acute stage, which usually lasts eight to ten days, is an unfavorable period, because the infection has not become definitely localized and thrombi have not firmly formed. When general peritonitis or abscess is present, operation is useless. If acute endocarditis, pulmonary abscess or pneumonia be present the patient should not be operated upon. A localized pleurisy or signs of beginning pneumonia do not contraindicate interference. Early

¹¹⁴ Surgery, Gynecology and Obstetrics, October, 1917.

operation should be done to prevent an extension of the thrombosis to the vena cava.

In regard to the method of operation, the transperitoneal operation is the only one to be commended. In pure septic thrombosis, ligation of the involved veins is sufficient. Excision should be reserved for periphlebitic processes or when thrombosed veins present are of sufficiently large number likely to lead to perforation. Excision of some of the pelvic veins is practically impossible by reason of very deep location. The number of veins to be tied depends upon the duration of the disease; the earlier the operation, the greater the number to be ligated. Some urge that the common iliac upon the affected side be tied as a routine measure, but this has not met with great acceptance. Ligation of the hypogastric has not been satisfactory, but ligation of the common iliac as a routine measure should receive further trial.

The interesting question arises as to whether the operation has reduced mortality of puerperal pyemia; this is given as on an average of 60 or 70 per cent.

In discussion, Hirst was opposed to the operation, which did not seem to him reasonable, as thrombosis he considered a conservative process on the part of nature. He reported 37 cases of puerperal septic infection with 5 deaths, or a mortality of 13.5 per cent. The operation consisted in removal of diseased tissues followed by free drainage.

THREE CASES OF SEVERE PUEPERAL INFECTION CURED WITHOUT HYSTERECTOMY. Chapput¹¹⁵ reports 3 cases of severe puerperal infection, 1 with subacute metritis, salpingitis and generalized peritonitis, the other 2 infected placental detritus and peritonism without peritonitis. These cases recovered after uterine T-incision and filiform abdominoureterovaginal and abdominovaginal posterior drainage. As the three cases showed signs of peritonitis, uterine curettage by the lower route was contra-indicated and laparotomy alone was indicated to verify the condition of the peritoneum and other abdominal organs.

The technic of the T-incision is simple; if time is an object, incision of the vagino-uterine cul-de-sac may be omitted. The anterior uterine wall is incised on the median line from the fundus to the vesico-uterine cul-de-sac, the uterine horns are then opened with scissors as far as their extremities; the lips of the incision are drawn back with a retractor and the cavity inspected. If there is any septic metritis, he curettes; if the placenta is retained, it is resected; when the mucosa and uterine muscles are gangrenous over a large area, a total abdominal hysterectomy is practised. To drain the uterus through the vagina, the uterus must be dilated with a Hegar dilator. Besides a partial T-incision, a complete T-incision may be done by incising the vesico-uterine cul-de-sac, exposing the bladder and incising the uterus down to and including the vagina; this gives better drainage and permits good disinfection. When the neck is infected it is best not to suture a uterine incision; an open abdominourtero-vaginal drain is placed in the uterus and vagina and a rubber strip interposed between the uterine edge. The uterine fundus must be

¹¹⁵ Bull. et mém. Soc. de chir. de Paris, 1917, xlivi, 353.

sutured to the abdominal wall to obviate secretions reaching the peritoneum. The Douglas filiform drain, not having the inconvenience of tubular drains, Chapput considers it very valuable for open abdomino-vaginal posterior drainage. By this method the uterus can be saved in aseptic cases when the conditions render conservative treatment possible.

INTRAVENOUS INJECTIONS OF COLLODIAL METALS IN PUPERAL INFECTION. Willette¹¹⁶ divides puerperal septic cases into two groups: aërobic, generally by streptococci, which are the most frequent and in which collodial metals are useful, and anaërobic infection and mixed infection amenable to oxidizing or mixed treatment. To get good results, large doses of collodial metal must be given intravenously. The action is explained by the rapid modification of the humoral condition occasioned by the injection of the metals with their peculiar physical properties. The fall in temperature, leukopenia followed by leukocytosis, improvement in the general condition and increase in the amount of urine indicate their beneficial effect.

PUERPERAL GANGRENE OF THE LEG. Knipe¹¹⁷ describes the case of a Russian woman, aged thirty years, who had two living children, one thirteen and the other seven years of age. She had had one miscarriage one and a half years previous to admission. The patient's history indicated a pregnancy of about seven weeks, and she stated that two weeks before entering the hospital she had attempted abortion by introducing a hat-pin into the uterus, and within a week she began to have chills, fever and sweating, abdominal pain and bleeding from the vagina, although abortion did not occur until two days previous to her admission to the hospital. The patient stated that during this period she lost weight and became pale. Abdominal examination showed tenderness over the lower right quadrant and to a less degree in the left iliac region; there was slight hypogastric tenderness. There was a slightly fetid discharge from the uterus. The external os admitted one finger. The uterus was slightly enlarged and tender to pressure; there was tenderness and resistance of the right vaginal fornix, with a small immovable mass involving the right side of the ovary, tube and broad ligament. The patient's extremities were not edematous. Examination of the urine was normal; leukocytes, 30,000; polynuclears, 90 per cent.; smear from cervix showed diplococci and streptococci. Blood culture was sterile for seventy-two hours after incubation. On the day following admission, the patient had a chill and thereafter during her stay in the hospital chills occurred frequently. On the third day after admission she complained of pain in the right leg and foot; this became worse and moderate swelling appeared, and in four days the toes on that foot became dark blue, the swelling greater and the whole extremity was edematous. Gangrene, first dry and then moist, started from the toes and involved the foot and lower quarter of the leg, and within sixteen days after the onset of pain in the foot a line of demarcation formed in the leg. The patient grew rapidly worse, with distended abdomen, and died from purulent peritonitis, three weeks after admission to the hospital.

¹¹⁶ Jour. de méd. de Paris, August, 1916.

¹¹⁷ American Journal of Obstetrics, 1916.

Autopsy showed adherent thrombosis of the inferior vena cava from a little below the diaphragm, occluding more than half of the lumen; the common iliac vein on the right side was partially occluded; the external iliac and femoral veins were absolutely occluded to the popliteal space as were all the branches; the left common iliac vein was partially occluded, the left external absolutely. The other arteries were normal. The infection in this case was a mixed one, starting from thrombo-phlebitis of the right broad ligament.

PELVIC INFECTIONS: THEIR SURGICAL TREATMENT. Cullen,¹¹⁸ in an illustrated paper upon this subject, gives the results of his personal observation and experience. In dealing with *appendix abscess* he finds that the appendix can practically always be removed at the same time if the abscess is well walled-off with gauze before the attempt is made to open it. When it is necessary to remove a large pus tube adherent to the pelvic floor, the operator should begin by excising a wedge of the uterine cornu and gradually freeing the mesosalpinx. The tube can then be lifted up and carefully walled-off on all sides before it is shelled off from the pelvic floor, as this will reduce the danger of soiling the pelvic tissue to a minimum. In placing drains from the vagina they should not be allowed to come in contact with the small bowel, and vaginal drains laid in the pelvis during abdominal operation should not be removed, as a rule, before four or five days, because of the danger of pulling down an adhesive loop of bowel. Vaginal drainage of pelvic abscess may relieve the patient only temporarily; other abscesses may develop requiring repeated operation and ultimately an abdominal section. In cases of pelvic abscess, irrigation should not be practised; there is danger of rupture of the abscess wall and of the escape of infectious fluid into the abdomen.

Pelvic infection following puerperal sepsis usually develops in one or both broad ligaments; such can be opened best outside the peritoneum by a gridiron incision just about Poupart's ligament. Such accumulations should rarely, if ever, be opened through the vagina.

Disease of the Teeth during the Puerperal Period. Waller¹¹⁹ believes that the teeth in nursing women should be carefully looked after and that all breaking down or decay should be immediately repaired. Improvement in health is sure to follow, and, so far as the mother is concerned, the length of time during which she can nurse the child will be very considerably prolonged. Improvement accompanied the registration care in 80 per cent. of about 200 cases.

Inversion of the Uterus. De Lint¹²⁰ had under his care a case of inversion of the uterus and describes 2 other unpublished cases. He tabulates the details of 5 cases of inversion caused by the presence of a tumor and also a number of puerperal cases, bringing the total to 29 during the last 20 years in Holland. This is three times as large as the record in German-speaking countries during a similar time.

In De Lint's case a complete inversion followed forcible pressure by

¹¹⁸ Surgery, Gynecology and Obstetrics, August, 1917.

¹¹⁹ Lancet, 1916, exci, 785.

¹²⁰ Journal of American Medical Association, August 25, 1917.

the nurse on the fundus through the abdomen for the expulsion of clots on the day after delivery. Attempts to push the uterus back by pressure from the vagina were unsuccessful. Finally a part of one side was pushed into the cervix, and as the obstetrician was trying to do the same on the other side the uterus suddenly slipped back entirely into place. It was irrigated by hot solution of thymol, 1 to 1000; the vagina was tamponed, the pelvis raised and the patient was given ergot, and fluid was given by the drip method; there was fever and excessive lochia at first, but at the end of a week the patient was sitting up, and by the end of the month the uterus was normal.

All of the cases recovered in De Lint's clinic except 5 who died from anemia and 1 whose uterus had ruptured. One of the patients died a year later from cancer of the uterus. In only a very few cases did inversion occur spontaneously during the emptying of the bladder or bowels, or when in a stooping posture.

Writers agree that in replacing the uterus it is best to use very gentle manipulation, forcing small areas back into place, thus starting the internal contractions of the uterine muscle and the organ will replace itself. In 5 of the total of 29 cases, after an effort at manual reduction had failed, the uterus was restored by working through an incision in Douglas's pouch, or in the posterior wall of the uterus itself, or the fundus was seized with forceps introduced through a laparotomy opening. The reduction was facilitated by seizing the uterine ligaments while the uterus was pushed up from below.

In the 521 cases of puerperal inversion of the uterus occurring during a period of twenty-two years the mortality was 16 per cent.; 3 of the women died from the shock of the reduction. In the writer's series the mortality was 20 per cent., but none actually succumbed to shock.

Shock seems to be caused by traction on the peritoneum, and reduction of the uterus puts an end to this. It is shown that, even when inversion has lasted for a long time, patient and persevering manual reduction may safely accomplish replacement. The interval after version had occurred varied from four days to eight months; in 1 case the diagnosis was made the twelfth day and reduction occurred spontaneously one week later. De Lint described a case mentioned by Castex in a tribe of Arabs: The woman was lifted by her two feet by two men, head down, and a bottle of oil was poured over the protruding uterus, which was then easily pushed into place; reduction had been impossible before this. The woman died a few days later from peritonitis.

INVERSION OF THE UTERUS FOLLOWED BY RECOVERY. Shoemaker¹²⁰ reported the case of a multipara, aged twenty-one years, who delivered herself at her home of an eight-and-a-half-pound child. The placenta came away immediately afterward and apparently dragged the uterine body turned inside out. The endometral surface of the uterus protruded through the vagina and lay in contact with the soiled quilt and unwashed thighs of the patient. There was profuse hemorrhage. The physician crowded the uterus inside the vagina but was unable to invert it; a

¹²¹ American Journal of Obstetrics, August, 1917.

gauze pack was introduced into the vagina in contact with the inverted uterus when the hemorrhage subsided. The patient was exsanguinated, with extreme pallor, dyspnea and almost pulseless. On admission to the hospital she was stimulated and gradually improved, and twelve hours later it was thought safe to remove the vaginal packing and gently douche the vagina with antiseptic solution. The hemoglobin was 10 per cent. There was retention of urine for the first twenty-four hours, and a mass presenting in the vagina, now tightly filled it. Above the pubis was the indented ring of uterine muscle.

During the first forty-eight hours there was a moderate oozing, gradual increase of temperature to 104° and then a copious bloody discharge from the vagina, with a very foul odor. The presenting endometrium was brownish gray in color; there was no sign of peritonitis and the patient was cheerful and free from pain. There was a well-marked hemic precordial murmur. The exfoliating surface of the endometrium gradually drained by way of the vagina, and during the next four weeks the temperature gradually decreased and the odor of the discharge disappeared. The vaginal mass diminished in size and at the end of four weeks a copious hemorrhage occurred, doubtless a form of menstruation. Five weeks after delivery, hemoglobin had increased from 10 per cent. to 46 per cent. All symptoms of infection disappeared and it was decided to attempt to reduce the uterus by operation. Under ether, the uterus was pulled out of the vagina to such an extent that it could be plainly seen. A T-incision was made across the cervix to separate the bladder and the internal cervix sufficiently to permit the operator to split the entire cervix and uterine wall in the middle line without injuring the bladder. There was very little bleeding.

On grasping the two sides of the protruding uterus with the thumb and fingers it was possible to turn the organ right side out as one would turn a hollow rubber ball. After turning the peritoneal covering of the uterus, together with the tubes and round ligament, these presented in the vagina instead of the endometrial aspect of the organ which had been presenting. The peritoneal surfaces lacked luster and were covered lightly with lymph, but showed no sign of infection. It was necessary to suture the uterus before reducing the fundus into the peritoneal cavity, through a cross-incision in the bladder, by using three layers of chromic catgut, the upper half being finished first and reduced through the opening under the bladder, after which the remaining half of the incision in the uterine wall was similarly sutured down to the cervix. The entire uterus was now in the normal position and the anterior incision was closed except for a small drain. The patient made an uninterrupted recovery.

ACUTE INVERSION OF THE UTERUS. Griffin¹²² describes the case of a patient, aged thirty-five years, strong and well-nourished, who began to have epilepsy at thirty years. The last one was one month before labor. The patient was a primipara, and labor was characterized by frequent and very hard pains, with the cervix hard and rigid. The

¹²² American Journal of Obstetrics, October, 1917.

occiput had rotated behind upon the right side. The pains became more violent and the patient strained strongly until she became exhausted and was finally delivered by forceps, with ether. The child was cyanotic but was revived. The uterus had apparently disappeared from the abdominal cavity and the placenta was found protruding through the cervix with the cord attachment directly in the center. Upon grasping it, it yielded very readily and came through the cervix bringing the fundus with it, so that the whole mass was entirely outside the vulva. The uterus was at once successfully replaced by taxis, and ergot and pituitrin were given to promote involution. Phlebitis developed in both legs, which was not severe and from which she made a good recovery.

Puerperal Retroversion Managed by Posture. Beck¹²³ states that up to a year ago 20 to 25 per cent. of hospital cases returned to the postpartum clinic with retroverted uteri. In these cases the discharge examination, at the end of the second week, usually revealed no tendency to retroversion. From these circumstances an effort was made to discover some method of treatment that these patients could carry out at their homes and thus prevent the development of retroversion. This method was found in what is known as the kangaroo walk, in which the patient is made to walk on all-fours with the palms of the hands on the floor and knees held as stiffly as possible; the patient cannot do this if the abdomen be constricted by corsets or skirt band or if she wears high-heeled shoes. The exercises are usually begun on the ninth day after delivery, the distance being increased each day until at the day of discharge from the hospital they are continued for five minutes in the morning and five minutes at night. When the patient leaves the hospital an effort is made to impress upon them the value of faithfully continuing this procedure.

A study of these cases shows that during the latter part of the second week of the puerperal period, while the patient is walking on all-fours, the fundus of the uterus falls forward and out of the pelvis and rests on the abdominal wall slightly above the symphysis pubis; the cervix is carried posteriorly and moves slightly with each step; there is a distinct lateral rocking of the pelvis; as a result involution is stimulated and tendency to retroversion is markedly lessened.

The writer had recently examined 82 women who had followed this method more or less faithfully; of these, 8, or slightly less than 10 per cent., had slightly retroverted uteri, 3 of these 8 stated that they had exercised for sixteen days or more after leaving the hospital, 2 continued for six days and the remaining 3 discontinued it in less than six days after discharge.

The effect of this method of treatment on involution was very marked; previous to its use patients often returned to the clinic complaining of bleeding and backache, and examination would show a soft, subinvolved uterus. In this series only 1 returned for bleeding, and, as a rule, among these patients the uterus was smaller than was to be expected

for the period of the puerperal state; furthermore, there was a much smaller percentage of patients complaining of constipation and backache. In discussion it was thought that this method of treatment was much better than simple knee-chest posture because the exercise produces an active change in the circulation of the pelvic viscera, and this improves the condition of the uterus.

The Cure of Prolapse of the Uterus. McGlinn¹²⁴ contributed a paper upon this subject in which he reviews the literature and summarizes the experience of various authorities in the treatment of this condition. In all cases of complete prolapsus, cystocele, rectocele, and prolapse of the uterus are all present. There are other complications, such as endometritis, laceration of the cervix, hypertrophy of the cervix, enlargement and atrophy of the uterus, ulceration of the cervix and ulceration of the vaginal mucous membrane. It is important to consider whether the patient is a multiparous or a nulliparous woman. If possible no operation should be performed upon a young woman that would interfere with pregnancy or labor; if, however, the general health was sacrificed it would be the duty of the obstetrician to sacrifice the child-bearing function. In the case of women who have had children the choice would be less difficult. If sterilization is to be effected, the entire Fallopian tubes should be removed. Before the menopause no operation should be performed which would interfere with the discharge of material from the uterus; this would rule out the interposition operation otherwise successful.

In the cure of cystocele which accompanies prolapsus, the interposition operation is usually most successful. The Goffe operation which suspends the bladder at a higher level on the uterus or united broad ligaments with anterior colporrhaphy should form an integral part of all other operative procedures. The pelvic floor and the perineum must also be restored and the writer favors a flap-splitting operation, with suture of the levator ani muscle and fascia in the midline between the vagina and the rectum.

Lacerated cervix must be repaired or amputated, and endometritis should be treated by curetting and the application of iodine. When there are ulcerations of the cervix and vagina, these should be cured before operation is performed for prolapsus, unless it be amputation of the cervix or hysterectomy. If a denudation is required and if the operation will remove ulcers in the vagina they require no treatment before operation.

Enlargement of the uterus should be treated by hysterectomy or by removing a wedge-shaped piece from the body of the uterus. The problem is more difficult when there is atrophy of the uterus, and, in extreme cases, the obliteration of the vagina will effect a cure.

It must be remembered that these patients are usually bad operative risks; they have lowered vital resistance, are often advanced in years and take anesthetics badly. It may be necessary to use local anesthesia by injection. With these patients vaginal operations, as a rule, are safer

¹²⁴ American Journal of the Medical Sciences, November, 1917.

than abdominal unless the element of time is of importance. In bad cases a high fixation of the uterus under local anesthesia may give considerable comfort, although not curing the patient. When no form of operation is permissible the Menge pessary should be tried.

The Influence of Grippe upon Parturient Women. Chome¹²⁵ reviews the experience at the Tarnier Clinic in a prevalent epidemic of grippe and has examined the records of individual cases. He finds those of mild type, some in which grippe was contracted during the very last days of pregnancy and others in which the infection developed during the puerperal period. In some it seemed to have brought on labor, in others the infection first appeared immediately after labor, followed by chills and high temperature, which speedily subsided. The pulmonary form of grippe may become severe during pregnancy and during the puerperal period and may give rise to pneumonia. During pregnancy, streptococcus sore throat may complicate the condition of the patient, although the infection is usually successfully resisted. During the puerperal period, otitis media, going on to suppuration, may develop; in 1 case this was complicated by erysipelas of the face, in another the puerperal period showed not only grippe but erratic pulmonary congestion. A pregnant patient having a severe form of grippe went on to labor and then developed meningitis from which she died; another pregnant patient with the pulmonary form of grippe had premature labor, dying thirteen hours later. A pregnant patient attacked by grippe at the end of pregnancy died of peritonitis, another perished of pulmonary edema and pleurisy, another died of peritonitis (grippe having developed at the beginning of labor), and in another case the patient, who contracted grippe during the last days of pregnancy, developed pneumonia, and death occurred a short time after labor. So far as the effect of grippe upon pregnancy is concerned, if the infection be a mild one and sporadic it does not seem to affect the pregnant woman seriously; but when it occurs during an epidemic, in which many cases are severe, it constitutes a serious accident which may be of extreme gravity. Grippe during pregnancy is dangerous in proportion to its localization, and most dangerous in the pulmonary form, and pregnant women are especially liable to this; thus nine-tenths of the cases of grippe show pulmonary complications. The occurrence of labor has an unfortunate influence upon the course of the disease, and this is especially marked in pulmonary form of grippe. In many cases a septicemia develops whose secondary manifestation is in the peritoneum, which often results fatally. This is especially apt to develop in women in whom labor comes on during the acute stage of the grippe infection.

OBSTETRIC SURGERY.

Davis¹²⁵ reviews the present position of obstetric surgery as a modern science. While there still remain relics of ignorant practice in the attempt to apply forceps to the unengaged head and the delay which so often results in the loss of the child, still there has been definite and decided

¹²⁵ Archives mensuelles d'Obstétrique, January, February and March, 1917.

¹²⁶ Surgery, Gynecology and Obstetrics, February, 1917.

gain in the growth of obstetric surgery as a modern science. Contracted pelvis and disproportion have been made far less formidable; foci of infection and pathological conditions in the pelvis or abdomen complicating labor are successfully dealt with. Lacerations in the genital tract produced by labor are promptly and adequately repaired. So far as the interests of the child are concerned, delivery by abdominal section is the safest artificial method of birth.

It is pertinent to inquire whether the results of modern obstetric surgery, as compared with the results obtained by spontaneous labor, justify the performance of obstetric surgical operations.

It is difficult to estimate the maternal mortality of labor outside of institutions. A conservative estimate would place the maternal mortality of spontaneous labor at a fraction of 1 per cent. under ordinarily favorable conditions. The mortality of spontaneous labor for the child is that of asphyxia and birth pressure, and while it is difficult to obtain exact figures upon this point, still it cannot be neglected.

When in contrast with these mortality rates, we compare that of the classic Cesarean section, we find that in cases where mother and child are in good condition, Cesarean section frequently has a series of 40 to 60 cases without maternal death. If larger series be taken, a mortality of from 2 to 3 per cent. is a high estimate. In the writer's 151 cases of patients in good condition, the maternal mortality was 0.066 per cent.

The use of the forceps is attended with considerable maternal morbidity. Thus Gans, in the clinic at Koenigsburg, had 21 per cent. maternal morbidity in the use of forceps, and 3.82 per cent. cases of severe septic infection. Episiotomy was required in about 25 per cent. of the cases, and of patients delivered by forceps, more than 50 per cent. sustained lacerations. The perineum was torn in 17 per cent. of the cases. The fetal mortality attending the use of forceps varies with the mode of application. In well-conducted maternity hospitals the so-called "low" applications had a fetal mortality of 10 per cent. which increased as the forceps was introduced high in the pelvis, to 38.5 per cent., an average of 14.5 per cent. In the Koenigsburg clinic, the fetal mortality attending the use of forceps was 12.45 per cent., with a mortality of 33.33 per cent. for the high application. When these results are compared with those of Cesarean section in well-selected cases, it is seen that Cesarean section is a conservative operation.

The indiscriminate application of Cesarean section as a last resort is not modern obstetric surgery, but is the old and familiar error which for so long a time prevented the development of modern obstetric science.

As modern surgery is most successfully practised by well-educated surgeons, so modern obstetric surgery can only be successfully performed by obstetricians trained in modern obstetric science. A thorough education and sound judgment are necessary for the proper selection of cases. Upon this depends, in large extent, the success of obstetric operations.

Cesarean Section. THE TECHNIC OF CESAREAN SECTION. Neve¹²⁷ describes his methods of performing Cesarean section in the Kashmir

¹²⁷ British Medical Journal, May 12, 1917.

Mission Hospital. The preliminary douch of potassium permanganate solution is given, the abdominal wall cleansed with 1 in 500 solution of mercury and alcohol, and painted with tincture of iodine. The field of operation is surrounded by sterile towels. The peritoneum is opened at one point and the wound enlarged by scissors. A large pad is placed behind the uterus which is brought forward from the abdomen. The upper angle of the abdominal wound is clamped firmly together, embracing the lower segment of the uterus. A sponge is placed in the peritoneal cavity on either side of the cervix and a warm sterile towel is drawn tightly around the uterus where it emerges from the abdominal cavity. The uterine incision does not extend over the fundus, and, if the placenta be anterior, it is removed immediately. If posterior, the child is first extracted. Hemorrhage from uterine sinuses is controlled by finger pressure, and the uterine wall brought together by interrupted catgut sutures. A second row of continuous sutures enclose the upper portion of the muscle and edge of the peritoneum, and a fine continuous suture is used to completely cover the wound with peritoneum. If the case has been attended by midwives it is regarded as septic and suprapubic drainage is employed.

NORMAL LABOR FOLLOWING CESAREAN SECTION. Broadhead¹²⁸ reports the case of a patient whose first child was very large and was stillborn by breech extraction. The second labor, after three hours' duration, with a large child, was terminated by Cesarean section. The patient had a flat pelvis, considerably contracted, and was urged to have labor induced at eight months or to have another section. This the patient declined, stating that she proposed to await spontaneous birth. When labor came on the head descended low in the pelvis and was easily delivered by forceps. The child was a male, weighing nine and three-quarter pounds.

The writer also reports a Cesarean section for contracted pelvis, with twin pregnancy; the children were unusually large for twins, one weighing seven and a quarter pounds and the other six and a quarter pounds. The patient made an uninterrupted recovery.

Warner¹²⁹ reports the case of a primipara with placenta previa and rigid and undilated os. She was successfully delivered by Cesarean section, the uterus being closed by four rows of suture. A year and a half afterward the patient gave birth to a full-term child without incident, the scar showing no sign of yielding.

The reviewer has had the same experience in having patients delivered by Cesarean section for placenta previa give birth to a child spontaneously in subsequent labor. In these cases the uterine muscle had not been overstretched by long labor, infection was absent, the uterine muscle was carefully and very thoroughly brought together and the patients made good recoveries.

CESAREAN SECTION FOR PREMATURE DETACHMENT OF THE PLACENTA. Hillis¹³⁰ reports the case of a primipara in the ninth month. For thirty

¹²⁸ American Journal of Obstetrics, April, 1917.

¹²⁹ Ibid., October, 1917.

¹³⁰ Journal of American Medical Association, December 8, 1917.

days there had been a slight albuminuria. Blood-pressure did not exceed 120. The patient was struck in the abdomen by the head of a three-year-old child who ran to her and threw himself in her lap. This caused considerable pain, which was soon forgotten. Some days afterward the patient walked some distance and was taken with pain in the lower abdomen and back, which was continuous. Then a small discharge of fresh blood occurred from the vagina.

When examined, the uterus was tense and painful and there was constant pain in the lower abdomen and back. It was difficult to make out the fetus because the uterus was tense, but fetal heart sounds were plain but variable. There was no dilatation of the cervix, but the vagina contained semifluid blood. On section, the child was not asphyxiated and a clot of blood was found in the uterus. It was firm, and attached to it were others smaller. The placenta had been partially separated, and the uterus did not contract well after it was emptied. There were areas of mottled discoloration in the peritoneum covering the uterus, showing extravasation of blood. The uterus was made to contract by injecting pituitary extract into the uterine substance. Both mother and child made good recoveries.

CESAREAN SECTION PERFORMED THREE TIMES IN THE SAME PATIENT. Crook¹³¹ describes the case of a patient with contracted pelvis, true conjugate two and a half inches. In her first labor, a foot and umbilical cord presented and the child was dead when delivered. The patient was infected, but recovered after some delay.

The second section was elective, and a living female child weighing seven and a quarter pounds was born. The mother passed through scarlet fever during her convalescence, but made a good recovery.

At the third operation the patient requested that sterilization be performed. Accordingly the Fallopian tubes were ligated and divided and the peritoneum stitched over each end with catgut. Mother and child made good recoveries.

EXTRAPERITONEAL CESAREAN SECTION. Chamorro¹³² describes five extraperitoneal Cesarean sections successfully performed by him. He combines the method of Latzko and Doederlein, and believes that infection of the genital passages or uterine cavity is not a contra-indication. Good drainage must be secured and good union so that the scars will not give way in subsequent labors. As the uterus is opened in the lower segment it is well to press out the fetus, if possible, rather than to use the obstetric forceps. It is especially indicated in cases of well-marked pelvic contraction when infection is present or is suspected.

A SIMPLE METHOD OF PERFORMING EXTRAPERITONEAL SECTION. Cherry¹³³ performs extraperitoneal section by making an incision in the median line from the symphysis to the umbilicus through the skin, fat and fascia of the recti. The muscles are separated by blunt dissection, exposing the transversalis fascia and peritoneum. The edges of the muscles are bluntly dissected off the peritoneum until the deep epi-

¹³¹ British Medical Journal, October 20, 1917.

¹³² Semana méd., 1917, xxiv, 149.

¹³³ American Journal of Obstetrics, October, 1917.

gastric vessels are seen. The peritoneum is opened vertically and the cut edges of the parietal peritoneum are sutured to the visceral peritoneum, leaving an oval area about five inches long and three and a half inches wide, exposing the lower uterine segment. Care is taken to interrupt and tie this continuous suture to prevent it from acting as a purse-string. The general peritoneal cavity is thus shut off. The lower uterine segment is incised in the median line for four and a half inches, the obstetric forceps introduced to the sides of the head and the child delivered. The placenta and membranes are then removed. Pituitrin and ergotol are given; the uterine wound is closed by interrupted chromic gut sutures; a continuous suture is made over this line and the sutured edges of the peritoneum are brought together. The rest of the wound is closed without drainage.

THE DANGER OF ELECTIVE CESAREAN SECTION. Harrar¹³⁴ calls attention to some sources of danger in performing elective Cesarean section before labor with undilated cervix. He believes that the separation of the membranes from the wall of the uterus by the hand is dangerous because of the liability of drawing infected material from the vagina in through the cervix. In certain cases in which the cervix has not been effaced, the chorion may remain covering the internal os, thus blocking the cervical canal. In such a patient blood may be retained indefinitely until the patient passes into shock. It has been suggested that the membranes be separated with the finger in the cervix before operation, but this is dangerous because of the possibility of infection.

CESAREAN SECTION FOR FETAL DYSTOCIA. Moran¹³⁵ reports a Cesarean section for a living child weighing eight and three-quarter pounds with an unusually ossified cranium and unusually large cranial diameters. In a second case section was done for a brow presentation with a slightly asymmetrical pelvis, a very rigid cervix and external os dilated but two inches. Manipulation to correct the presentation had failed. The cord was around the neck twice. Mother and child made good recoveries.

THE CESAREAN SCAR. Losee¹³⁶ contributes a valuable paper upon this subject, illustrated by microscopic drawings. He examined 20 different specimens of uterine scar removed from the uterus at or near term. All the previous Cesarean operations were of the transperitoneal operation of the high incision type. In 9 there was complete or partial rupture of the uterus and in 11 an incision was made either through the old scar or adjacent to it, and the whole scar or the edges were afterward excised for examination. Many specimens were taken while the uterus was partially contracted and others after rupture, with complete contraction. Sections for microscopic examinations were made from different areas of the tissue. In a clean wound after incision, leukocytes, red blood cells, fibrin and later young connective-tissue cells separate the surfaces. These are afterward absorbed and eventually the muscle and fibrous tissue disappears, the muscle bundles assume

¹³⁴ Bulletin of Lying-In Hospital, New York, 1917, xi, 46.

¹³⁵ American Journal of Obstetrics, May, 1917.

¹³⁶ Ibid., July, 1917.

the relationship normally observed in other areas of a postpartum uterus. Other than thickened peritoneum there is no scar tissue observed macroscopically or microscopically in the myometrium in the line of the former incision when examined at subsequent operations.

When infection takes place and the cut surfaces are infiltrated with leukocytes and serum, associated with more or less necrosis, then only that muscle tissue remains which has not become necrotic. Such a scar at operation is from 0.5 to 2 cm. broad, white and depressed. The tissue comprising it may be only serosa and decidua, or these may be separated by varying thicknesses of muscle, depending upon the extent of destruction or the degree of union which has taken place after the operation. This pathological process may take place in one small area of the wound or may extend throughout. Even in these cases no excess of fibrous tissue is observed in the line of incision; however, in two of the scars examined a small amount of muscle adjacent to the decidua was replaced by fibrous tissue. Nearly all of the sections examined showed a thickened vascular serosa which occasionally invaded the adjacent myometrium for a short distance. This invasion may have been due to some inversion of the serosa in suturing and in others to a proliferation of the fibrous tissue of the peritoneum. In only 1 of the 20 cases did the fibrous tissue extend into the muscle to a marked degree, and even then it was not sufficient to weaken the scar.

The study of these specimens showed that the strength of the uterine scar after Cesarean section depends upon the absence from the wound of infection and foreign material and upon the perfect coaptation of the incised surfaces. A perfectly healed wound leaves the myometrium as strong after operation as before, so far as can be determined by the histological examination of the tissue in the line of the former incision. A continuous suture in the myometrium adjacent to the decidua may assist in preventing the separation of the cut surfaces by blood clot or lochia in addition to the usual interrupted suture through serosa and myometrium. The placenta in a subsequent pregnancy has little or no effect in weakening the firmly united scar, but, if the scar is already weak, it may increase this weakness. Other than a small amount of fibrous tissue beneath the peritoneum, the myometrium in line with the former incision contains no scar tissue and the uterine muscle regenerates. Rupture invariably takes place through the site of the former scar and not through the adjacent muscular tissue. As we have no definite means of estimating the strength of the uterine scar after Cesarean section, subsequent pregnancies must always be carefully observed as they approach term.

The writer appends to his article a table giving the details of the 20 cases studied. It is interesting to observe among these that syncytial and inflammatory cells were present in the scar in but 4 cases.

Spalding¹³⁷ contributes an article upon this subject, illustrated by reproduction of microscopic illustrations and gross specimens. He reports 4 cases.

¹³⁷ Journal of American Medical Association, December 1, 1917.

His first was a white woman, aged thirty-two years, in her third pregnancy, in whom the cervix had been previously amputated. At the second labor a general surgeon performed a Cesarean section followed by recovery without fever. Labor under consideration began with strong pains with the fetus in breech presentation. The membranes ruptured and meconium was noted in the liquor amnii. The pain stopped and pituitrin was given which caused hard uterine contractions. An attempt was made to deliver the child by breech extraction, but the head could not be extracted. Finally the body severed, leaving the head in the uterus. The patient became moribund, with rapid pulse and moderate bleeding from the vagina. Hysterectomy was immediately performed, no rupture of the Cesarean scar appearing in spite of the severe labor and pituitrin. The patient died shortly afterward and the uterus was examined and a microscopic study made of the scar. Sections of the uterine wall revealed fairly distinct layers of muscle tissue, with a thin layer of decidua. The placenta was *in situ* and the villi were normal. At one point the muscle tissue thinned out to a hair-like line, beneath which there was a layer of hemorrhage which overlay the proliferating villi. In places the thin peritoneal coat was ruptured. This occurred at the site of the old Cesarean incision. Beyond this the muscle wall again thickened. In the scar, distinct muscle bundles were lacking and had been replaced by wavy fibrillar connective tissue.

His second case was a white woman, aged twenty years, with a simple, flat, contracted pelvis, whose true conjugate was 7 cm. Labor was premature, with breech presentation, the presenting part being above the brim. The patient was given a choice of Cesarean section and pubiotomy, and preferred the former. At operation the incision was made in the midline below the umbilicus and the uterine incision in the midline on the anterior wall of the uterus into the placenta. The incision in the uterus was closed with two layers of interrupted chromic catgut and one layer of continuous suture. Lembert chromic suture was used in the peritoneum. The patient recovered normally without fever.

About two years afterward the patient returned to the clinic in labor, with the fetus in vertex presentation. After nine hours of good uterine contractions without engagement the Porro operation was performed. Upon examination the scar showed much fibrous tissue, with practically no muscle cells. There were a few bloodvessels in the scar, but no decidual or syncytial elements. The normal elastic elements seen in the muscle tissue were lacking in the scar, which appeared strong, although fibrous and shrunken. There was no evidence of rupture in this scar.

His third case was that of a white woman, with flat, rachitic pelvis, delivered by Cesarean section in 1912 and who had moderate fever on the day of operation. She recovered and left the hospital. She returned in labor about three and a half years afterward, with breech presentation without engagement; membranes ruptured. No engagement occurred, although the membranes were ruptured and after two

hours of labor she was delivered by Porro operation. Incision was made through the right rectus below the umbilicus and there were adhesions between the uterus and anterior abdominal wall. Microscopic examination showed that the scar was the same as the other muscle tissue, except for slight fibrin changes and slight depression in the mucous membrane.

Case 4 was a white woman, pregnant for the second time, in the seventh month of gestation. Twenty-one months previously she had had Cesarean section at term. The pelvis was slightly contracted in a number of diameters. The laparotomy scar extended from the ensiform around the left side of the umbilicus midway between the umbilicus and symphysis. A ventral hernia occupied the line of the old incision. No history of the convalescence could be obtained. On examining the scar, a very thin layer of muscle tissue, without fibrous tissue, was present, the placenta being attached to a thin layer of decidua. On either side of the scar there was much fibrin enclosing decidua, fetal cells and muscle fibers. Masses of syncytium were seen some distance away from the scar, between the muscle bundles.

It seems justifiable to conclude that more than 10 per cent. of Cesarean section scars are defective. The chief factor in producing this condition is imperfect healing of the endometrium. When the incision is into the placental site this may be due to the degeneration of the decidua serotina or the scar may be weakened by the inclusion of the decidual tissue in the muscle wall. Although 2 cases have been reported in which syncytium attacked a well-healed scar, there is not much evidence to uphold this view. The placenta is frequently found overlying the weakened scar in cases of rupture. This may produce rupture from retroplacental hemorrhage or may act as a splint to support the weakened scar. Of 75 reported cases, all but 1 were ruptured in the upper part of the uterus. From this one might infer that extraperitoneal section into the lower portion of the uterus would give a better prognosis as regards subsequent rupture. The mechanism of rupture is probably a water wedge forced by intra-uterine pressure into the defective scar. The danger of rupture of the uterine scar should lead to the very careful discrimination in the selection of the operation.

In discussion, several operators brought out the fact that the strength of the uterine scar after Cesarean section depends on the absence of infection and foreign materials and upon the perfect coaptation of the tissues. A perfectly healed wound leaves the myometrium as strong after operation as before. A continuous suture in the myometrium adjacent to the decidua may assist in preventing the separation of the cut surfaces by blood-clot or lochia. The placenta has little or no effect in weakening the firmly united scar, but, if the scar is already weak, it increases this. Rupture takes place through the scar and not through adjacent muscular tissue. Each patient who has had a Cesarean operation must be carefully observed in subsequent labor. Various operators gave some idea of the frequency of rupture. One stated that rupture had occurred once in 60 repeated Cesarean sections. A thin scar occurred 9 times. In 6 patients with normal scar the placenta was

directly under the section incision. In repeated section it is better to excise the old scar.

THE ABUSE OF CESAREAN SECTION. Williams¹³⁸ believes that Cesarean section is much more dangerous than is generally acknowledged. This he ascribes to the fact that the operation is so often performed upon patients who have been some time in labor and who have become infected. He has studied 45 uteri amputated at the time of labor, and a large fraction in these showed acute inflammation of the decidua originating in the cervical region and spreading upward so that in extreme cases the entire interior of the uterus had become involved. These patients had no elevation of temperature before operation. In his series of operations the total mortality has been 8 per cent., while but 1 patient has been lost when the operation was done at the time of election. Williams practises pubiotomy upon contracted pelvis of moderate degree. His experience is that of others, and among these cases 75 to 80 per cent. will deliver themselves spontaneously.

In placenta previa he believes that occasionally a case with rigid cervix and profuse hemorrhage may well be treated by abdominal Cesarean section. Otherwise he prefers the introduction of a dilating bag. In eclampsia the operation is occasionally indicated in primiparae with unoblitiated and rigid cervix and narrow birth canal, who show no signs of improvement after copious venesection. In multiparous eclamptic women the operation is not indicated. As regards cases with complicated presentation of the fetus when the child is dead and the mother has become infected, if the woman has already borne a number of children the body of the uterus may be sacrificed to save the life of the mother. If, however, she is a primipara this should not be done. There is no place for Cesarean section as a routine measure in breech presentation. Elective Cesarean section for women physiologically unfit for labor is indicated.

CESAREAN SECTION AND PLACENTA PREVIA. Kroenig¹³⁹ contributes an article upon Cesarean section and placenta previa. If the clinical principle be accepted that not only must the mother but the child be saved, then Cesarean section must be seriously considered for placenta previa. The attachment of the ovum to the lower uterine segment infiltrates the tissues with cells and makes it impossible to safely perform vaginal Cesarean section. The effort to deliver by vaginal section or by version or by rapid dilatation is often followed by severe and fatal hemorrhage. In favorable cases abdominal Cesarean section through the body of the uterus will give the best result.

Abdominal Hysterotomy. Hellman¹⁴⁰ has reported 12 abdominal hysterotomies, 4 for disproportion between head and pelvis, 1 for transverse position, 3 for placenta previa at or near term, 1 for congenital occlusion of the birth canal, 2 for eclampsia at term and 1 for eclampsia at six and a half months. Both the eclamptic patients at term died with convulsions, otherwise the results were good. In performing the opera-

¹³⁸ Surgery, Gynecology and Obstetrics, August, 1917.

¹³⁹ Deutsch. med. Wchnschr., 1916, xlii, 1178.

¹⁴⁰ Surgery, Gynecology and Obstetrics, March, 1917.

tion, a high incision is made at the fundus from one Fallopian tube to the other.

The writer gives 13 indications for the operation. The first in frequency is disproportion between the fetus and the pelvis, and next, as plainly indicated, tumors obstructing labor, and concerning these two indications there is at present no ground for discussion. Central placenta previa at term and separation of the placenta are considered in the main to justify Cesarean section. Eclampsia and malpositions resulting especially from ventrosuspension justify the operation. Deformities of the birth canal, severe cardiac conditions and the floating head above the pelvic brim are also held to be valid indications. It is stated that once a Cesarean always a Cesarean. To this many would take exception.

Among the unusual indications are gunshot wound through the gravid uterus, the sudden death of the mother before the death of the child, tonic contractions of the uterus after the amniotic liquid has escaped and prolapse of the cord with undilated cervix.

Anterior Abdominal Hysterotomy. At a meeting of the Obstetric Society of Philadelphia, B. C. Hirst¹⁴¹ reported the case of a patient who presented herself with hemorrhage after an abortion five weeks previously. Upon examination, the uterus was enlarged, retroflexed and lacerated. Some time afterward the patient appeared, stating that she was then pregnant and suffering great pain. Upon examination there were evidences of a two months' pregnancy, the uterus being firmly fixed in a position of anteversion and extremely sensitive. The injuries to the birth canal had not been repaired. This patient had been operated upon by an abdominal section and the uterus opened for inspection and possible curetting. The uterus had not been removed, but was sutured and dropped back. The advice given to the patient on her first visit was to have curetting done, with scrapings examined, and then the round ligaments shortened to correct a retrodisplacement, and that the muscles in the genital tract could be repaired. The patient, however, was left with a condition in which scar tissue and adhesions made it impossible to relieve her without hysterectomy.

Version for Presentation of the Trunk at the Umbilical Region. Arteaga¹⁴² had the opportunity of observing an unusual presentation and position. The mother was a multipara, aged thirty-three years, in whom the os was well dilated, but the descent of the child was blocked. A thorough examination suggested an incomplete breech presentation. So soon as the membranes ruptured the umbilical cord protruded. The cord was followed up into the uterus; the lower extremities could not be reached nor could the upper portion of the child. Under anesthesia, with considerable difficulty, a foot was finally grasped which proved to be the right, and then the other foot was secured. Under complete anesthesia and with very gentle manipulation podalic version was performed and a perfectly developed child delivered. The mother made

¹⁴¹ American Journal of Obstetrics, April, 1917.

¹⁴² Ibid.

a good recovery. It was impossible to ascertain a definite cause for this unusual position and presentation.

Pulmonary Complications following Operations. Cutler and Morton¹⁴³ have studied the pulmonary complication following operative procedures at the Massachusetts General Hospital. They find that anesthesia, when considered alone, and when the anesthetic has been skilfully given, cannot be considered as a sufficient cause for pulmonary complications following operations. Statistics show that 1 in 54 cases operated upon develops some condition of the lung afterward, and 1 in 106 dies. This should call attention to the predisposing cause of pulmonary complications.

First in importance among these is poor general condition, with its accompanying factors of age, anemia, alcoholism, arteriosclerosis, weak heart or susceptible lungs.

Second in importance is a septic condition of the mouth from carious teeth, necrotic foci and septic tonsils. Preexisting pathological conditions of the lung, as tuberculosis, bronchitis, emphysema or a recent pneumonia, are of importance. The bad giving of the anesthetic is a factor of great weight. If the anesthesia is forced, if the patient is permitted to aspirate mucus and there is unnecessary manipulation of the nasopharynx, with vomiting on the table, the risks of pulmonary complications are greater. The presence of septic foci in the lungs naturally exposes the patient to the additional risk. Operations which are extended to the epigastrium expose the patient to danger of pulmonary complications because of the vascular and lymphatic connections of this region with the lungs. The chilling of the surface of the body by fluids or by cold air creates vasomotor disturbance which predisposes to disturbance of the lungs. Many patients suffer severe pain after operation because the lungs expand too sluggishly and hypostasis is the result.

In avoiding these complications it is of considerable importance that oral sepsis be eradicated; an antiseptic mouth wash should be used and the teeth very carefully brushed. Some urge mechanical scrubbing of the mouth with citric acid. When operations are those of election the patient should be under observation for at least two days before the actual performance to ensure absence of lung pathology and septic foci. Too much care cannot be taken in giving the anesthetic; ether should be given by the drop method. Mechanical appliances should be kept out of the mouth and nose and the surgeon should be ready to operate as soon as the patient is ready so as to avoid prolonged anesthesia. It is well to avoid exposing the patient upon the table, and unnecessary wetting of the surface of the body must be avoided. Also, after operation the patient must be kept warmly covered. Operating rooms should have a temperature above 75° F. In abdominal operations the liberal use of hot, wet packs is indicated. The less violence done in operating and the more strict the aseptic precautions, the better will be the results. Hypostasis should be avoided by getting the patient up and out of bed

¹⁴³ *Surgery, Gynecology and Obstetrics*, December, 1917.

as early as possible, by allowing her to move freely in bed, and by avoiding tightly constricting bandages over the upper portion of the abdomen.

Shock during General Anesthesia.—The obstetric surgeon is frequently annoyed by the development of shock during general anesthesia in the performance of various obstetrical operations. This subject in general has been studied by Mann.¹⁴⁴ The most common cause of shock is bleeding. Patients react differently to loss of blood, and it is very hard to accurately estimate the quantity of hemorrhage during a given operation. Trauma of the viscera by prolonged or unskillful handling also produces shock. Excessive nerve irritation under an anesthetic is probably a much more rare occurrence than clinical reports would seem to show. The mechanism involved in these cases is unknown. In fractures and operations involving trauma of large areas of fat, where shock develops after the operation, pulmonary fat embolism may be the cause. The suprarenals have to do with the development of shock, but to what extent and how is not definitely known. Nerve impulse probably has no definite relation to shock. When etherization is carried very deeply, most of the symptoms of shock can be produced. When etherization has been not only deep but prolonged, other conditions develop, as low blood-pressure, subnormal temperature, and other changes. Some conditions called surgical shock may be due to a combination of deep anesthesia, with reflexed inhibition of respiration. Ether does block afferent impulses to the higher centers, but some of the reflexes involving the medullary centers, particularly those which inhibit respiration, are not blocked when very strong stimuli are employed.

Forceps Delivery Complicated by Separation of the Pubic Symphysis. Allen¹⁴⁵ reports the case of a primipara whom he saw thirty-six hours after forceps delivery of a living child. The pubic symphysis had separated over three inches. There was marked laceration of the soft parts and loss of control of the bladder. The bones were readily brought together, but it was very difficult to maintain them in good position, so a Lane plating was decided upon. This was carried out without great difficulty by a four-screw plate and supporting straps of adhesive plaster. The patient was not carefully nursed and was rolled in bed quickly and carelessly. After some weeks the bones were found to be separated as widely as before, with a small fistulous opening extending to the loose end of the plate. She was then brought to the hospital, and on removing the plate it was seen that the bone was too weak to support any sort of plate. Two half-inch incisions were made over the iliac crests at the upper anterior iliac spines and two wire nails were driven into the iliac crests, the endeavor being made to try to follow the normal slope of the ilium so that the nails would be entirely in bony tissue, and these nails were left protruding above the skin about a half-inch; the bones were then pressed firmly together and sterile iron wire was wound tightly around the nails from one side to the other, across the abdomen, and a tightly fitting plaster cast was put over the pubic bones.

¹⁴⁴ Journal of American Medical Association, August 4, 1917.

¹⁴⁵ American Journal of Obstetrics, May, 1917.

While this cast was setting the patient was held up in a sling and then put in a trough-shaped bed. In eight weeks she was able to walk about, and two years after the operation she was in perfect condition.

Myomectomy of Myomas of the Uterus. Mayo¹⁴⁶ states that so far there has been no good explanation of the absence of myomas in the voluntary muscle and the frequency of this in involuntary muscle. It is shown that 12 per cent. of white and 30 per cent. of colored women of fifty years of age have uterine myomas. In the Charity Hospital in New Orleans 50 per cent. of colored women over thirty-five years old who have not borne children have myoma of the uterus. It has been estimated that 30 per cent. of women with myoma died within five years if not operated upon. In 2274 cases Nobel found pathological conditions in 30 per cent., which would have led to death had the myomas not been removed. In women of the child-bearing age the risk of hysterectomy for the treatment of myomas should be limited as much as possible; myomectomy is the preferable operation.

Mayo states that in 504 consecutive myomectomies there were four deaths, a mortality of 0.8 per cent. Of these cases only 5 required hysterectomy later for complications which developed. Myomectomy is not often done in those over forty years, and not frequently done in those over thirty-five years. The majority were those under thirty-five years and practically under thirty years. Fourteen patients were pregnant at the time the myomectomy was performed, and the majority went on to term and were delivered of living children. In the latter group the tumors were degenerating and the patients had acute symptoms, indicative of spontaneous emptying of the uterus; but the disturbance quieted down with the removal of the tumor and without premature expulsion of the child. In no case was he obliged to do hysterectomy on the pregnant uterus with a non-viable child.

Of the 504 patients from whom myomas were removed, 24 have had living children since the operation and 7 have had two or more. Thirty-eight living children in this group of patients is a strong argument for conservative operation. Five others are normally pregnant at the time of writing.

Congenital Absence of the Uterus and Vagina. Novak¹⁴⁷ describes the operative treatment of this condition. A transverse peritoneal incision is made at the site of the vaginal outlet; the tissues of the perineum are dissected between the bladder and the rectum until the peritoneum is reached; the abdomen is then opened and a loop of the ileum about twelve inches long is carried down with its mesentery into the cleft made from below, the peritoneum having, of course, been opened; the ends of the loop are severed from the ilium above, the two cut ends of the latter being anastomosed with a Murphy button. The loop of bowel which is to form the vagina is closed off upon the peritoneum being secured above the cut end; the lower end of the loop is opened, the bowel wall being sutured to the skin edge. After some time the septum between the two segments of the loop is removed. So far there has been no mortality following the operation, and the results have been good.

¹⁴⁶ Journal of American Medical Association, March 24, 1917.

¹⁴⁷ Surgery, Gynecology and Obstetrics, November, 1917.

THE NEWBORN.

Importance of an Eye-ground Examination in Infants after Difficult Delivery. Kearney¹⁴⁸ estimates that intracranial hemorrhage at birth is responsible for 70 per cent. of the spastic type of paralysis in children and 20 per cent. of the resulting idiocy and feeble-mindedness now existing. To determine the question of injurious pressure during birth, Kearney urges the importance of an examination of the eye-ground in infants after difficult delivery.

If a direct-method ophthalmoscopic examination of the fundus of the eye be made there will be seen a mild blurring of the upper and lower margins of the disk and the nasal half of the disk and its margins in the first few days after the birth of the child. This extends to the entire surface of the nerve head and all its margins later on. The blurring is more pronounced on the nasal half of the disk and its margins. When large hemorrhages occur, considerable edema takes place early. When these eye-ground changes are noted and at the same time there is an increase in the pressure of the cerebrospinal fluid, with or without convulsions or symptoms, unusual pressure is present and a simple cranial decompression operation is indicated.

Of 1387 children having spastic paralysis, of ages varying from one day to twenty years, examined with the ophthalmoscope, 287 showed the distinct edematous changes described. In other words, 1 child in 5 among those having spastic paralysis, with or without mental impairment, gave ocular evidence of intracranial hemorrhage. Of the total number of children examined, 21 per cent. showed distinct signs of increased intracranial pressure.

The earlier the operation is made the better, for in any infant under ten days old operation affords a means of drainage of the blood, whereas in older children it is done merely to offset the pressure of the former hemorrhage. In 287 children treated by this operation, the mortality was 10 per cent.; 9 were operated upon the first day of life, with 1 death. Of the remaining 8, 6 are apparently normal. Six infants were operated upon the second day after birth, with no mortality; 3 on the third day, with no mortality.

Of the 287 children operated upon, only 39 were not first children, Only 11 were not at full term, and 260 of the 287 were born in difficult labor, forceps being usually employed, and, in many cases, with high application. Of the 287 cases, 226 had convulsive twitching immediately after birth, and in 249 the spastic paralysis was noticed after the eighth month of life; 149 of them were hemiplegic, 51 paraplegic and 87 diplegic. The longer the condition has existed the less the immediate improvement following operation, yet 7 children who had never walked, each of them over 8 years of age, subsequently learned to walk fairly well. In general, there is a very satisfactory improvement, both in the condition of the nervous system and the mental development.

A written permission for autopsy was obtained in each case before

¹⁴⁸ American Journal of Obstetrics, December, 1917.

operation, so that if the patient should die an accurate study of the case could be made and valuable data learned for similar cases. In 29 patients who died, a study of the brain was made, and in 28 of them the diagnosis of intracranial hemorrhage was confirmed. Moving pictures have been taken of a large number of these patients before operation and then at intervals of six months following the operation. In this manner the lessened spasticity and the resulting improvement in gait can be accurately shown and recorded. The Binet mental tests have been used before and after operation and the mental improvement in many of the children has been most impressive.

Injuries at Birth, Premature Births and Stillbirths. Miller¹⁴⁹ has studied the vital statistics of the city of Philadelphia and finds that there is an average of 73 children dying each year from injuries received at birth. This gives a rate of 1.95 to each 1000 living births; there has been a gradual decrease for the last three years.

Premature births also are decreasing. Two per cent. of deaths from all causes among infants are credited to premature births. When it is estimated that 40 per cent. of these could be prevented, this shows a loss of 2748 lives to the city of Philadelphia each year. If the net worth of a citizen is estimated at \$90, this means an economic loss of \$247,320.

In seeking the causes for 100 stillbirths, syphilis was given in 4, injuries at birth in 5, strangulation of the cord in 3, polyhydramnios in 1 and convulsions of the mother in 1. This indicates how indefinitely these conditions are often described.

The Report of a Very Large Fetus. Brodhead¹⁵⁰ had the opportunity to examine a child born with the attendance of a midwife, the head born spontaneously. Much difficulty was experienced in extracting the shoulders and the child was finally delivered dead. Its only injury was a fractured humerus; its weight on the hospital scales was fifteen pounds eleven ounces.

The diameters of the head, of importance, were the occipitofrontal, 12.75 cm., biparietal, 10.25 cm., occipitomental, 14 cm. The occipitofrontal circumference of the head was 40 cm., the circumference of the shoulders 48 cm., and the abdomen 44.5 cm. The length of the child was 60.5 cm. The experience of various obstetricians was collected by the writer, and men of large experience had never seen a child weighing more than fifteen pounds.

A Malformed Fetus. Slemmons¹⁵¹ reports the case of a patient in whom pregnancy was normal except for slight albuminuria about a month before labor. The mother's blood-pressure was never high and there was a history of twins on both sides of the family. Delivery occurred at practically the expected date and was accomplished by easy application of forceps. Immediately after the birth of the child a mass about the size of a hen's egg was expelled. This was attached to the placenta and came away with it. The loss of blood was normal. The child was a male and apparently normal in development.

¹⁴⁹ American Journal of Obstetrics, October, 1917.

¹⁵⁰ Ibid., June, 1917.

¹⁵¹ Ibid., May, 1917.

On examining the specimen it was found hanging in the amniotic cavity of the normal fetus, and it was surrounded by an amnion of its own. The tumor was attached to the placenta by a pedicle covered by amnion which stopped at a point 1 cm. before the tumor was reached. This pedicle contained an artery and vein, and these vessels could be followed to the base of the umbilical cord of the normal fetus.

The shape and color of the tumor suggested a kidney, and its surface was much like that of a kidney from which the capsule had been stripped. On section, the tissue was much like kidney tissue, and in the center of the tumor there was a miniature bone. The pedicle was covered with amnion and contained two vessels, an artery and a vein surrounded by the usual jelly. The structure of the pedicle was that of an umbilical cord except for the fact that only one artery was present.

The structure of this tumor showed that it was a teratoma and its vascular supply indicated that it was a fetus. The existence of a normal umbilical cord and a pseudocord, with a common insertion upon the placenta, showed that the case was one of single ovum twins.

What Can Be Done to Improve the Physical Condition of Human Offspring? Schumann¹⁵² contributes a paper on antenatal pathology, and raises the question, What can be done to decrease the number of imperfect infants born and to lessen in each case the imperfection which is developing?

He believes that a thorough, analytical history of the parents is of importance. Parents should be urged to keep a careful and minute history of their own health and that of their offspring, thus frequently the history of hemophilia is entirely overlooked and a newly born child is lost because proper care has not been exercised. Then the mother should be periodically examined during pregnancy to detect signs of abnormality in the growth of the fetus. Fetal movements should be studied, evidence of faulty circulation ascertained and interference from malnutrition of any cause. Very frequently fetal disease is associated with pain or discomfort on the part of the mother, and such conditions should be investigated not only with reference to the mother but to the child.

In diagnostinating disease of the fetus we can often recognize hydramnios whose presence is frequently accompanied by monstrosities or twins. When the fetal heart is very weak and irregular, it points to a monstrosity in which the nerve centers are badly developed. A positive Wassermann reaction shows beyond question that the fetus is infected with syphilis.

In the treatment of the child before birth the examination of those contemplating marriage is certainly a wise precaution. During pregnancy the general hygiene of the mother and protection for her from infection and wounds are of value. In pregnant, syphilitic women, salvarsan and mercury are indicated. When the mother gives the history of hemophilia, calcium salts and a blood serum will help.

Artificial Respiration in Asphyxia of the Newborn. Held¹⁵³ has devised an instrument which has given much satisfaction for the performance of artificial respiration in infants. It consists of a syringe bulb connected

¹⁵² American Journal of Obstetrics, June, 1917.

¹⁵³ Journal of American Medical Association, April 13, 1918.

by rubber tubing with an air valve in the dome of a small helmet-shaped mask and connected by a Y-tube of an ordinary rubber toy balloon. The latter serves as a reservoir, and as its expansile tension is about 8 mm. of mercury it prevents the air-pressure in the child's lungs from rising above that point. It also produces a uniform, steady flow of air.

To use this apparatus successfully the upper respiratory passages must be clear. In cases in which it is probable that the placental circulation has been cut off before the head was born, as in breech presentation or prolapse of the cord, a tracheal catheter should be introduced and the trachea cleared by suction. After the mouth is cleared out with the gauze-covered finger, a thread on a needle is passed through the tongue to hold that organ well forward, but not outside of the mouth. A towel is wrapped snugly, but not tightly, about the child's abdomen to prevent air from entering the stomach. While an assistant keeps the balloon inflated by compressing the bulb, the operator holds the mask with its long diameter transversely over the child's mouth, including the chin but not the nose. With the index finger of the same hand he manipulates the piston and the air valve, pressure on which allows the air to flow. With the finger and thumb of the other hand he alternately compresses and releases the nostrils through which respiration takes place. By pressing the air-valve piston, at the same time compressing the nostrils to prevent escape of air, he inflates the lungs. Simultaneous release of the air-valve piston, stopping the air flow, and release of the nostrils allow expiration to take place through the nostrils. As soon as the nostrils are released and the air valve is closed, the natural resiliency of the lungs and thoracic walls causes a partial collapse and the escape of a considerable portion of the air. This alternate simultaneous opening of the air valve and closing of the nostrils (inflation) and closing of the air valve and releasing of the nostrils (expiration) is kept up rhythmically and as rapidly as is consistent, with rather full expansion and deflation, and as long as necessary to induce normal respiration.

It is alleged that this instrument gets air into the lungs of the child quickly in a manner much like that of natural breathing and without danger of injury to the child. It is not expensive, occupies small space, and the necessary parts can readily be replaced.

Microbes in the Parturient Canal and in the Newborn. Hymason and Hertz¹⁵⁴ have examined mothers and children to see if they could determine the relationship between bacteria found in the genital tract of the mother and those present in the newborn. Forty-two cases are tabulated, with positive results in 16 and negative in 26; in only 4 cases were the same germs found in the maternal passages and the mouth and rectum of the infants; in the other 6 positive cases the findings were not uniform; in 1 case streptococcus was found in the vagina, staphylococcus in the mouth and the colon bacillus in the meconium; in another the streptococcus, colon bacillus and Staphylococcus albus were all found in the vagina, and the streptococcus and staphylococcus in the rectum, with the absence of the *Bacillus coli*, while in the mother there

¹⁵⁴ American Journal of Obstetrics, April, 1917.

was no growth. In 1 patient the staphylococcus was found in the vagina and colon bacillus in the meconium of the child. In another patient the staphylococcus was found in the vagina and colon bacillus in the meconium. These findings are practically like those of European investigators, which show negative results on the first day of life, evidence of the infection of the infant's mouth from the mother's vagina before the second day, with staphylococci very much more abundant than the streptococci.

Asphyxia Neonatorum. Fairchild¹⁵⁵ treats the asphyxia of the newborn by removing mucus or other substances from the upper air passages of the child. The infant is placed facing the physician in slightly inclining backward upright position of the body while the physician's hand supports the infant's back and head held in such a way as to effect the most direct entrance of air. The nurse is at hand with a glass of very cold water to give the physician a mouthful from time to time; he then spouts it from his mouth in forceful jets against the front of the thorax of the child; this water blowing is continued at the rate of one time in four or five seconds and is shortly followed by success.

Hofmeister has rejected methods of treating asphyxia in the newborn which oblige the physician to swing the body of the child. He believes that treatment by insufflation is most successful; to do this properly the trachea and larger bronchi must be cleansed by introducing the catheter and aspirating the mucus and fluid, then a quantity of air is forced into the child's lungs by moderate pressure so that the thorax rises gently; the first noticeable effect is upon the heart; after a few insufflations the heart's action improves almost immediately, and this is the first indication that the child may still be saved. The child must be kept warm by moist, hot towels and a hot bath. If breathing begins and is active, the catheter may be left *in situ* to observe whether there will be other respiratory movements. To help the child, slight compression of the thorax should be made at regular intervals. The only difficulty in the method is the introduction of the catheter, which may be very hard in very young children.

The reviewer has employed all of the standard *methods of treatment* for asphyxia in the newborn, and, in his experience, but two procedures are of value: (1) The mouth and fauces must be cleansed as thoroughly as possible from blood and mucus, and (2) the child is grasped by the legs with one of the physician's hands while the other is placed behind the child's back at the neck and shoulders; the child is held with head down; the body is then folded slowly but firmly while an average count of six is made; it is then completely unfolded or extended with the same average count. When the child's body is folded together the abdominal viscera are brought up against the diaphragm and air is forced out of the chest, and blood is forced out of the abdominal vessels into the heart and thoracic vessels; when the child is unfolded a vacuum occurs in the mouth and respiratory passages, the diaphragm descending, and air enters.

During these manipulations the child's mouth should be repeatedly

¹⁵⁵ Surgery, Gynecology and Obstetrics, May, 1917.

cleansed with warm sterile boric acid solution applied upon small pieces of sterile, very soft, old linen.

This method has been so satisfactory and so successful that it has supplanted the writer's use of hot and cold water, insufflation, forcing air into the chest or swinging the child to produce the same result.

Congenital Transposition of the Heart. Aitken¹⁵⁶ describes the case of a young man, aged seventeen years, suffering from pulmonary tuberculosis. There was no cardiac impulse at all on the left side, but the apex beat was felt in the fifth interspace under the right nipple; the impulse was diffuse and sounds very indistinctly heard to the left of the sternum; at the base the sounds were faint but well heard at the apex. There were no murmurs. Percussion showed the area of cardiac dulness to extend from the right nipple to the sternum, but no dulness was made out on the left of the sternum. It was hard to define the upper limit of the heart on account of the pulmonary dulness in that region. The liver and spleen were normal. An x-ray plate showed that on the right side there was a shade which emerged with the liver shadow below and which had a curve to the left resembling that thrown by the normal right side of the heart. The patient seemed to have no inconvenience apart from breathlessness on exertion. It was thought at first that the heart had been drawn over to the right side by the contraction of the lung, due to the pulmonary tuberculosis, but on further examination it was found that this was not the case; the chest wall was hardly retracted at all. The condition was undoubtedly congenital, and the patient stated that such a diagnosis had been made by other observers.

The Treatment of the Umbilical Cord of the Newborn. Rendleman and Taussig¹⁵⁷ give the results of their study of 450 babies born at the St. Louis City Hospital. In half of these children the cord was amputated by the suture ligature method of Dickinson; in the other half the cord was ligated with two tape ligatures, one of which was placed near the skin margin of the umbilicus. No antiseptics were used except a single application of alcohol to the skin margin in the amputated cases. Dry, sterile gauze was placed over the umbilicus and was left unchanged until the suture was removed or the cord came off unless the dressing should become soiled. All the infants were cared for by the intern staff of the hospital. The nursing care and the records were in charge of a very experienced nurse. All premature babies were omitted from this series, as were all children born after very difficult birth or having some pathologic condition, only normal children being included.

The figure-of-eight suture was placed 2 mm. within the skin margin of the umbilicus, sweeping around to avoid puncturing the vessels. A moderately fine silk was used for suture material, and the suture, if not found clinging to the gauze on the third or fourth day, was cut and removed. In a few instances, through neglect, the suture was not taken out until the seventh or eighth day, but there were no untoward symptoms from this. The result of the Dickinson method of suture was favorable; beyond an occasional oozing from the skin stitch there were no compli-

¹⁵⁶ British Medical Journal, September 29, 1917.

¹⁵⁷ Journal of American Medical Association, December 8, 1917.

cations. There was one case of moderate bleeding after six hours which occurred in a baby in whom the resident physician had taken the stitch at the margin of the skin instead of through the skin cuff itself; this was not due to the method but to the improper technic.

It was impossible to trace these children regarding the occurrence of umbilical hernia. There was but one case, and that occurred one month after the birth in a child so treated, and the hernia was about the size of a 25-cent piece. There were no deaths from infection of the umbilicus.

The most striking difference between the two series of cases was in the temperature of the infants. Of 225 babies treated by suture, 37.7 developed a temperature of 100° F. or more within the first ten days, whereas in babies treated by ligature only 22.7 per cent. had fever. In both series the highest number of temperature elevations occurred on the third or fourth day; these were much more frequent among the sutured babies. This must be ascribed to mild infection because the suture passed through the skin was capable of absorption. These infections were not serious. The average loss of body weight from the first to the tenth day in the febrile sutured cases was 75 gm., whereas the average loss of the whole series was 68 gm. When the umbilicus wound was disturbed in its healing there was a watery, odorous discharge, granulomas or prolonged attachment of the cord, and in such cases there was a distinct advantage in favor of the suture method.

The most important index is the weight curve in infants. The average initial weight of the sutured babies was slightly in excess of those treated by ligature; the initial drop for the first three days was greater in the sutured cases and persisted for a day longer; from the sixth day on, however, these infants began to grow more rapidly than those treated by ligature. The interpretation of these variations indicate that sutured babies were unfavorably affected during the first four or five days as a result of the surgical removal of the cord, but at the end of that time the umbilicus had fully healed and these children then gained more rapidly than those infants whose cord was treated by ligature. Unfortunately, a considerable percentage of the mothers were compelled to leave the hospital within ten days, so that records are incomplete for the following days. Although suturing the cord at the onset is an increased tax on the strength of the newborn child, after the immediate effects are worn off the more rapid wound healing of the sutured navel brings about a gain in weight greater than in the child with ligated cord.

The writer concludes that the suture-ligature method will not greatly decrease the number of umbilical infections. The essential thing is asepsis, and if that is lacking it makes no special difference whether the cord is amputated or ligated. Umbilical hernias cannot be prevented by this method. The greater immediate loss of weight and the greater frequency of slight elevation of temperatures were striking manifestations of initial shock and the necessity of restricting this method to maternity hospitals under the direction of persons of obstetric experience.

The more rapid growth of the sutured baby after the fifth day shows that the slow healing of the umbilical wound by ligature method is to some degree a drain on the well-being of the child. The time saved

by the nurses when the cord is amputated is considerable and is of economic importance in the management of hospitals.

The writer urges the adoption of the Dickinson method of treating the cord in all maternity institutions under due precaution. He could find no valid objection to its use, but, on the contrary, it has certain definite advantages which, though not great, should make it a preferred method.

In discussing this paper, the suggestion was made that the cord be ligated at the junction of the skin; alcohol is then poured over the site at the regular dressing of the infant; it was also thought that a large percentage of digestive trouble, green stools and jaundice in infants in the first ten days is due to some grade of infection of the umbilicus. The consensus of opinion was that the method could not be trusted to the average general practitioner in private houses, but that in hospitals under experienced care it might give good results.

The Inheritance of Stature. In the *Journal of the American Medical Association* of October 13, 1917, occurs a review of the recent literature upon the inheritance of stature in the newborn child. It is thought that growth is influenced by conditions which are both external and internal; some of these are constitutional and others pertain to environment. It is evident that stature is determined by growth, and the conditions of life of the individual seem to determine the degree of growth, and this has more influence than hereditary condition. True, racial characters are hereditary, and as different races differ in stature it is because of hereditary factors. Some, on the other hand, think that difference in stature depends entirely on condition of development, so an infant's food supply may dwarf individuals. In the United States the people of the State of Kentucky are above the average in stature, and this has been ascribed to lime in the soil. It is much more likely that the true reason lies in the fact that in some portions of that State the population is descendant from Scotch ancestry; thus in Scotland County, North Carolina, in which the soil contains practically no lime the people are taller than those in the regions where lime is abundant.

Experiments have shown that growth can be suppressed by food of poor quality or by lack of proper food; if, however, the food supply is made adequate then the stunted population may resume its normal size; on the other hand, overfeeding, while it may affect weight, has little effect on adult stature. It may hasten growth and thus enable the individual to reach his full development early. That the quantity of food does not alter the type is shown in the fact that a bantam chick when heavily fed never develops into anything but a bantam fowl. Undoubtedly the activity of the various glands of internal secretion has an influence on the conditions and extent of growth, but these variations may be hereditary or racial.

An effort has been made to study scientifically the problem of inheritance of stature; it is not often that there is a clear correlation between the average time of onset of puberty and the average age of slowing up of growth; probably the former controls the latter. In the case of women the growth goes on up to about the age of fourteen years and then pro-

ceeds at a much slower rate; if the average rate of growth of women between the age of eight years and fourteen years was maintained up to the age of twenty-five years the average woman would be nearly seven feet tall.

Very tall men, according to record, tend to marry very tall women; men of moderate height tend to marry women of the average stature about in their proportion in the whole population. Short men tend to marry short women and very few tall ones. Persons of small stature tend to marry each other, and extremes are more particular in this respect than those of medium stature. The progenies derived from mating of similars vary less than those derived from mating of those of dissimilars. The offspring from two tall parents vary less in stature than those of two short parents. Shortness depends upon certain factors that inhibit growth. In the case of giants, when both parents are tall, all the children are tall, and this would indicate that the factors producing tallness are mostly recessive.

It seems to be established that general factors control growth only to a degree of less than one-half; on the other hand, special factors are present that control, independently, the growth of the various elements that go to make up stature.

Smallpox in the Newborn. Rothwell¹⁵⁸ reports the case of a woman pregnant three months whose husband was found to have smallpox. She and her two children and a man and woman who were taking care of the family were successfully vaccinated, the woman having a typical reaction. In six weeks the quarantine was raised; one month later the physician was called to see the patient, and on examination could find no signs of life in the fetus and the os uteri was dilated to about the size of a quarter. A mummified fetus of six and a half months was expelled. Life must have been extinct for some time, as the abdomen of the fetus was discolored and distended, and the abdominal muscles were very thin and fragile. There were round, yellow, slightly pitted scars about the size of the end of a lead-pencil distributed over the whole surface of the body in which the scabs had been detached in the womb, and vesicles and pustules that invariably accompany a severe case of variola vera were present. The mother had no sign of smallpox and had a normal vaccination scar.

The Declining Birth-rate. Richett¹⁵⁹ makes a report from a committee appointed by the Academy of Medicine of Paris to suggest measures to check the loss of population in France. It is thought to be of the greatest importance that a public fund be available to aid in the care of the child up to the appearance of the twentieth tooth. It is estimated that a sum equivalent to \$400 would frequently save the life of an infant child. The earnings of such a child would more than pay the outlay in a very short time.

A similar report in the *Journal of the American Medical Association* of October 27, 1917, is made concerning the control of child mortality in England. It has long been thought that maternal ignorance is a

¹⁵⁸ Journal of American Medical Association, October 13, 1917.

¹⁵⁹ Ibid.

large factor in causing excessive child mortality, accompanying this are intemperance, poverty, overcrowding, defective sanitation, industrial employment of married women and the large size of the families of the poor; but when the wives of wage-earners are compared with the wives of men of other classes, the conviction arising is that the main difference consists in the ability of one to secure the help necessary in the various contingencies of maternity and the early period of childhood and the lack of such help in the other. In England this situation is met by the regulation which require all births to be reported within thirty-six hours, and visits are made by officials from the public health authorities to ascertain the condition of the family. More than half of the total confinements in England and Wales are attended by midwives, hence the Act which provides for their regulation and also adds additional medical and surgical assistants is a most important one.

The Place of Infant Welfare in Public Health Instruction. Knox¹⁶⁰ recognizes the fact that the infant welfare first of all has to do with those measures which would improve the health of infants at birth. From the stand-point of the child the proper reason for the prevention of marriage in the unfit and the control of such persons should be presented; the use of alcohol and of drugs and the effect of syphilis and tuberculosis on parents and children are important factors. From the stand-point of obstetrics the public should be made aware of the necessity for good obstetrical practice by competent persons. The training or abolishing of midwives, the early registering of pregnant women at obstetric clinics, thorough prenatal care, proper obstetric service in rural districts and the establishment of obstetric substations under the control of the health department are all questions concerning which the public should be properly informed.

In the first year of life children die from congenital debility or prematurity, diseases of the digestive or respiratory tract and acute infections which are of great importance. Deformities and defects in development have also a considerable influence. The writer is opposed to the care of infants in institutions and thinks that infants should not be separated from the mother, but that she should be so cared for as to enable her to support herself and her child in comparative comfort. It would also be of value if some tests could be made of the mental capacity of unmarried mothers.

The study of the milk supply of the community is obviously of the greatest importance. Maternal nursing should be considered in its very important relation to infant mortality, and none the less because the patient may be of the poorer class. Housing conditions present a problem difficult to solve and of exceeding import. The fact that the negro presents more than double the white death-rate and morbidity rate, especially from infectious and venereal diseases, makes this race a very serious factor in the general well-being of the nation.

In many portions of the country negroes live under the worst possible conditions and infectious diseases and puerperal fever are common

¹⁶⁰ Journal of American Medical Association, October 6, 1917.

among them. Their failure to nourish their children properly often arises from insufficient income. This has been strikingly shown in communities where the income was less than \$10 a week; the death-rate was more than 200 infants in a thousand; where the weekly wage was more than \$25 the infant mortality was about 80 in 1000. An important factor consists in absence of the mother from home and neglect of the children. In the city of Lowell during a strike when the mothers could not work, infant mortality was reduced, and during the siege of Paris when the general mortality was double, the infant death-rate was one-half its usual size.

Intelligent care on the part of mothers is probably the most important element in preventing infant mortality.

Infant Feeding. CHEESE IN INFANT FEEDING. Menshikoff¹⁶¹ has obtained striking results in feeding infants with curds, often called cheese curds, in cases in which carbohydrates and soups and broths containing salt were not well digested. He describes cases in which children digested ordinary cows' milk badly, having diarrhea, edema, irregularity of the heart and general weakness, which were greatly improved by exclusive feeding with curds. In these cases, in which there is excessive fermentation in the bowels, diarrhea, green movements, much gas and irritation, a diet of rice water with curds seemed highly beneficial.

FOOD REQUIREMENTS IN INFANCY. The *Journal of the American Medical Association*, October 6, 1917, gives a review of the recent literature upon the food requirements in infancy. In estimating the need of food in the newborn infants it does not exceed 48 calories per kilogram each day during sleep; later the quantity rises to 60 calories. But healthy children cannot remain asleep or quiet all the time, and when in motion they expend much energy which requires reinforcement. It is proved that muscular activity of the infant increases its metabolism 67 to 70 per cent.; this leads to the suggestion that food requirements of the normal infant may be ascertained by adding to the calories used up by muscular activity those of the basal metabolism. If the child is very quiet, 15 per cent. should be added; if normally active, 25 per cent.; and if exceedingly active about 40 per cent.; to this result is to be added 15 per cent. for energy lost in excreta and 20 per cent. lost in growth. It is further ascertained that infants fed on cows' milk, with formulae containing a large amount of protein, require more food than infants fed on human milk, because the stimulating action of protein increases the appetite and also stimulates digestion.

BREAST FEEDING. Sedgwick¹⁶² does not attempt to put newborn infants to the breast at first; instead, the breast is grasped about 1 or 2 cm. back of the colored areola and a milking motion is carried out toward the nipples; no massage of the breast proper is allowed, as it is of little value and sometimes causes traumatic inflammatory reaction. It is useless to massage the whole breast, as this does not stimulate the discharge of milk, and in some instances hyperthyroidism may be the cause of the failure of the child to receive sufficient nourishment.

¹⁶¹ Journal of American Medical Association, October 27, 1917.

¹⁶² Ibid., August 11, 1917.

When there is not sufficient milk, additional food should be given immediately after nursing, and, in this way, a child's strength is maintained while the secretion of milk is kept up. If care be taken the secretion of milk can be reëstablished after a considerable interval and every effort should be made to do this.

THE MANAGEMENT OF WET-NURSES IN INSTITUTIONS. Abt¹⁶³ finds it best to select women for wet-nurses whose ages range from twenty to thirty years. When the wet-nurse is admitted to the hospital, her baby should be at least three or four weeks old. The mother should be carefully examined for pulmonary tuberculosis and diseases of the skin, glands and bones. A Wassermann test is made in every case and the vaginal secretion examined for gonococci. One must take the weight and appearance of the child into account and must be sure the mother is presenting her own baby for examination. The quantity of the mother's milk is judged by weighing the baby before and after ordinary nursing. If the baby of the wet-nurse is in good nutrition, shows gain in weight and has normal bowel movements, it is natural to assume the milk is of good quality. A chemical examination of breast milk is not of great value, for the composition of the milk varies so much during one and the same feeding and during different periods of the day that but little reliance can be placed on the test.

When the wet-nurse has passed the physical examinations she is admitted to the hospital, where she and her baby are provided with room and board. She receives a wage of \$8 a week and is required to do a little work, among other things the laundry for herself and baby and the care of her own room. It is necessary that she nurse her own baby at 7 and 11 in the morning and 3 and 9 in the afternoon. In this way there is no chance for stasis to occur. Babies nourished by wet-nurses are not put to the breast, but the milk is expressed from the breasts every four hours during the day and night. The wet-nurse expresses the milk at the same hours under the supervision of a head nurse and assistants. This is done under aseptic precautions and the breasts are completely emptied. The milk is received in sterile medicine glasses, and as soon as full they are emptied into sterile half-pint bottles. The expression of milk is closely watched, so that diluting the milk or substituting cows' milk cannot take place. A wet-nurse shows a daily quantity of milk expressed varying from $33\frac{1}{2}$ to 48 ounces. Wherever possible the breast milk is used immediately after it is secured; when an excess is obtained it is transferred in sterile bottles to the refrigerator in the milk station, where it is kept until needed. Breast milk is reserved for those babies who are desperately ill and who must be tided over critical periods. The milk is given in the same way any formula is given. Those children who are not too weak receive it from a bottle; those who cannot nurse are fed with a medicine dropper or by the Breck feeder, and still others are fed by gavage. The wet-nurses themselves are given a simple diet which is not excessive, and the food is that which she has been accustomed to have. In addition to her meals at regular times the wet-nurse

¹⁶³ Journal of American Medical Association, August 11, 1917.

receives a glass of milk every four hours day and night. Fruit is an important part of the diet and an abundance of water is also taken. The personal hygiene of the wet-nurse is very carefully supervised, and they secure ample sleep. The wet-nurse is not allowed to nurse her baby at night; she is given leisure in the afternoon, and if she goes out of the hospital she is required to take her baby with her. She is not allowed to leave the institution after dark and is required to be in her room by 8 o'clock in the evening.

Menstruation has little effect on lactation and none on the permanent quality of the milk. Statistics show that 50 per cent. of women do not menstruate, and 43 per cent. do, and, of these, 20 per cent. have regular periods during lactation.

As a rule the quality of milk tends to deteriorate toward the end of the first year, so that wet-nurses usually are not retained after they have been in the hospital for nine or ten months; one wet-nurse produced as much as 56 ounces in twenty-four hours in addition to that which she gave her own baby, but the average daily quantity obtained, excluding that given to her own baby, was about 37 ounces.

THE COLLECTION AND PRODUCTION OF HUMAN MILK. Hoobler¹⁶⁴ found that mother's milk could be purchased through the active coöperation of the Social Service Department of the Hospital, and at the Bellevue Hospital 1000 ounces per month were procured. At one time, in Detroit, he states that over 23,000 ounces of mothers' milk had been collected and distributed in six months. The milking of the breasts was done under the supervision of a trained nurse.

Mothers are admitted to hospitals to nurse their own babies; the milk is expressed every four hours, and if at the end of three months the mother is capable of producing from 16 to 24 ounces daily above the amount necessary for her own baby, she is urged to continue in the hospital for that purpose. If she has a suitable home she is urged to continue milk production as a means of earning her living; in each case she returns to the hospital two or three times daily to furnish the milk. Many mothers help in supporting themselves in this manner and also improve their general health. Those who remain at home are visited in their homes to be sure that their sanitary surroundings are good. They are thoroughly examined, Wassermann tests made and their babies are examined and weighed regularly. The milk collected is distributed to homes on orders received from physicians, and it was sold at prices varying from 10 to 25 cents per ounce. Some was supplied without cost to poor families. What was left after supplying the private demands was sent to children's hospitals and other hospitals with children's wards and sold at 10 cents per ounce. The milk used by families was sent for by those using it or occasionally delivery was made by special messenger. The distributing center was always open that milk might be obtained at any time day or night. Occasionally the child was nursed directly by its foster mother and sufficient milk expressed from the breast to furnish feeding for the night.

¹⁶⁴ Journal of American Medical Association, August 11, 1917.

A study was made of the best diet for nursing mothers, and such must be efficient to produce a sufficient quantity of milk so that the child will grow without impairing the tissues of the mother. Diets containing from 2600 to 2900 calories in twenty-four hours produce better results than diet containing 3400 to 3700 calories. It helps nothing to over-feed in the hope of maintaining the milk supply. Diet containing 2000 calories or less cannot protect maternal tissues and at the same time produce sufficient milk. A nutritive ration of less than 1 to 6 gives best results. For producing milk, animal protein is better than vegetable protein, while nut protein is as efficient as animal protein in elaboration of milk.

Cows' milk protein is best of all for nursing mothers.

In discussion it was stated that women can nurse a child three or four years, with advantage to mother and child. Breast milk can also be frozen and kept indefinitely and suffers no deterioration. It is also important that midwives and physicians report promptly each case of stillbirth, that an official of the health department of the city may then call upon such a mother and endeavor to secure her as a wet-nurse. Among the poor a woman who has an excessive supply of milk will often assist a neighbor in nourishing her child.

In one hospital breast milk was heated for one hour at 56° C. with concentrated hydrogen peroxide during the hot summer months and the milk kept in good condition for three weeks. Bacteriologically, when breast milk was brought to the hospital, it would contain from 300,000 to 1,000,000 bacteria per cubic centimeter.

Diarrhea in Infants from General Infections. Farrer¹⁶⁵ has noticed the deleterious influence of tonsillitis and other active infections which affect the gastro-intestinal tract. The younger the child, the more pronounced is usually the infection. The vomiting which occurs is often ascribed to some condition of the stomach, and harmful and unnecessary dietetic restrictions are imposed. Children may lose in weight until they suffer severely. Coccus infections are those most usually seen. Influenza has frequently produced in young infants a condition suggesting dysentery or cholera, although there need not be much catarrh of the upper air passages. In institutions this may become epidemic and simulate food poisoning. Simple dyspepsia may arise from the same cause and persist after recovery from the influenza. The severity of the gastro-intestinal disturbance may be out of all proportions to that of the influenza. The streptococcus is the special affinity for the bowel mucosa.

The treatment is practically the same as though the condition had been caused by infected food.

To avoid infection, visitors should be prohibited from entering the wards of hospitals and coming in contact with children. Glass partitions may be employed through which the children can be seen but not handled.

When grippe appeared in the hospital, infants were vaccinated with anti-streptococcus vaccine; only 9 of the 28 vaccinated escaped the infection,

¹⁶⁵ Journal of American Medical Association, April 28, 1917.

9 developed grippe, but in 7 it was very mild, with no fever and no diarrhea; in 3 others there was very slight fever. Only 35 per cent. of those affected developed diarrhea and only 1 had much vomiting. The vaccination was well borne, without appreciable reaction. It was preventive in 12 cases, and in 16 the grip was already present.

Removal of the Appendix in the Newborn. Vargas¹⁶⁶ observed an infant born with a gap in the abdominal wall, so that some of the viscera escaped. He reduced the extensive hernia and sutured the wall of the abdomen; in doing this the appendix presented and was removed. The infant immediately became better, its symptoms subsided and it made an uninterrupted recovery. The malformation was of the type of periumbilical cutaneous aplasia. The child made a good recovery.

Acute Meningitis in the Newborn. Condat¹⁶⁷ described acute meningitis in the newborn in the hospital. Meningitis is not so rare in the newborn as is generally assumed, but often escapes recognition; even lumbar puncture may fail to clear up the diagnosis. The symptoms are masked by the general infection, of which the meningitis is a complication. The pneumococcus is frequently found; less often found is the streptococcus.

Melena and Hematemesis. Solomona¹⁶⁸ reports the case of a young primipara who gave birth to a well-developed child in spontaneous labor. The family history on both sides was good. Within two days the baby was taken ill, with vomiting, restlessness, tarry movements of the bowel, streaks of blood and vomiting of blood. This was followed by collapse and cyanoses of the lips and fingers. A little later the child passed a large, bloody, offensive movement and the discharge of blood continued. Horse serum was injected and calcium lactate and adrenalin chloride were given. Under this treatment the child became somewhat better, and albumen water was given, which was followed by slow but steady improvement in the character of the discharges. The mother's breasts had been pumped during the child's illness and breast milk and rennet whey were successfully administered. The child was gradually fed by the mother entirely, and mother and child made a good recovery.

It is interesting to note the apparent benefit resulting from the use of horse serum in this case, and the reviewer has observed the same phenomenon in both the case of infants and adults.

The Resuscitation of the Newborn Infant by Massage of the Heart. Fisher¹⁶⁹ reports the case of a child born after a labor in which the head was delayed by a very resisting perineum. Chloroform was administered and delivery completed by forceps, and no time was lost in extracting the child. It was in pallid asphyxia, and artificial respiration did no good even after blood had been allowed to flow from the cord. Fisher pressed his right fingers deeply into the right epigastric region, brought them right under the ribs, invaginating the wall of the abdomen, while the left fingers pressed in the chest about at the left nipple and he was able to grasp the heart. The two sets of fingers were made to meet by

¹⁶⁶ Journal of American Medical Association, October 6, 1917.

¹⁶⁷ Ibid.

¹⁶⁸ British Medical Journal, June 9, 1917.

¹⁶⁹ Ibid., August 18, 1917.

rapid quick thrusts, and after five or six the heart started to beat; in about one or two minutes it was fairly established, and then artificial respiration caused the child to breathe in about five minutes; in about ten minutes the child had cried vigorously. There were no complications, and the child recovered. There were marks of pressure of the fingers on the chest for some time.

As a rule in cases of asphyxia the heart is still beating although feebly, and it has been thought useless to press efforts at artificial respiration when the heart beat could not be felt. If massage of the heart can cause it to beat after respiration ceases it should certainly be tried.

Influence of Labor on the Brain Development of the Child. Stein¹⁷⁰ reviews the literature of this subject, and from this study and from his own experience he concludes that prolonged unassisted labor is responsible for much avoidable harmful compression of the infant's skull in the birth passages during the period of labor. Unquestionably the damage sustained by the child's brain and meninges often affects intellectual growth, producing a degree of mental impairment from feeble-mindedness and imbecility to absolute idiocy.

Owing to the fact that there is no systematic coöperation between maternity hospitals and institutions for feeble-minded children, the connection between obstetrical traumatism and nervous diseases in the widest sense of the term has not received due consideration in the past.

In the interest of more efficient control of preventable idiocy, a better coöperation in the form of more detailed records of the conditions during labor and subsequent mental development of children is urged. A better understanding between obstetricians and neurologists would help to diminish the number of imbeciles and idiots. The obstetric forceps, correctly applied, is a beneficent weapon against the abnormally prolonged passage of the child's head through the pelvic canal.

Pituitary solution from 2 to 3 mm. in many cases hastens the course of labor, rendering the application of forceps unnecessary and safeguarding the contents of the infant's skull.

In discussion, Peterson stated that some years ago he had made a number of studies of infantile cerebral palsy and found that the chief cause of palsy occurring during parturition was tedious labor, with resulting intracranial hemorrhages. He stated at that time that the application of forceps in tedious labor did less injury than long-continued compression. These cases are complicated by epilepsy in 45 per cent., and even more common are the three degrees of defective mind, namely, feeble-mindedness, imbecility and idiocy.

Studies of hemorrhage in the central nervous system in stillborn children show that in 53 the blood came from the pia and arachnoid, 30 from the spinal canal and cord, 6 limited to the base of the brain, 7 from the lateral ventricles and the remainder in the longitudinal sinuses, lateral ventricles and brain substances.

Cragin believes the subject to be of very great importance, and he believes that permanent injury to the nervous system through birth

¹⁷⁰ Journal of American Medical Association, August 4, 1917.

pressure is not at all uncommon. He urges that the obstetrician carefully study, during pregnancy, the presentation of the child, and if abnormal that he correct it before labor comes on. He also urges that abdominal palpation be practised frequently and accurate diagnosis be made before labor. When birth occurs the mechanical factors must be carefully studied, the size of the birth canal and the comparative size of the fetus must be ascertained. In the actual presence of labor it is not the use of forceps, but delay which causes intracranial damage. Women must not be left too long in the second stage of labor, when it is evident that the head cannot enter the pelvis, Cesarean section should be performed. When the physician in attendance of the patient is not of necessary experience, he must obtain the help of others. In using the forceps there must be accurate diagnosis and ability to change the posterior rotation of the occiput to an anterior.

Mills described the manner in which the result is brought about as regards epilepsy, mental defect and other conditions. The essential factor was minute hemorrhage both in the membranes and in the cerebral substances with certain particular locations, probably a fall which would cause displacement within and outside the ventricle by pressure, and give rise to these hemorrhages. There were occasional examples of fracture of the floor of the fourth ventricle. In regard to the treatment of such cases, he urged that labor be not allowed to go beyond favorable limits.

Broadhead believes that a distinction must be made between molding of the head and injurious pressure; molding is entirely fundamental, and if it occurs gradually the brain accommodates itself to the condition and injury does not result.

Fisher had noted extensive destruction of the brain tissue in some of these cases; the hemorrhage was capillary and the symptoms varied with the area involved. There was marked degeneration of the brain structures in cases examined by autopsy, and, obviously, there could have been no recovery or improvement under such conditions.

The character of the uterine contractions is also of importance; if they are weak, several hours of labor may not be dangerous to the fetus, but if exceedingly strong the child may survive but a short time.

Excess of Male Children. Maurel¹⁷¹ compares the statistics of male and female infants in various European countries; in 1865, in most of the countries, the same relative excess of male children prevails, but since 1806 in France a gradual decline has taken place from 106.4 to 104.2. The younger the father the larger the proportion of male children. In a large town in the south of France and in other portions of France among well-to-do persons 126 male children were born to 149 girls; thus the male children were 84.5 per cent. and in some counties only 76 per cent. Among 100 gouty families were 52 without children, and in the others the male children were only 75. In regard to the mortality caused by syphilis it is the general impression that more female infants survive syphilitic infection than male.

¹⁷¹ Journal of American Medical Association, August 18, 1917.

The Operative Treatment of Stenosis of the Pylorus in Infants. Monnier¹⁷² has operated upon 4 infants for stenosis of the pylorus. One child was so emaciated that it seemed exceedingly hazardous to interfere. The vomiting stopped at once after the operation and the child rapidly gained. None of the children would probably have survived a more complicated operation.

The method employed was that of Rammstedt and consisted in slitting lengthwise the muscular fibers of the pylorus, which are always hypertrophied in these cases. The incision leaves the mucus membrane intact. The cut edges are separated 2 or 3 mm., leaving a gap in the depth, of which the mucosa can be seen slightly protruding. No suturing is done but sometimes a small flap of omentum is drawn over the gap. The whole operation takes only a few minutes.

Vulliet gives the child a few drops of chloroform or ether, drawing the pyloric region out through a small opening above the umbilicus. In these cases the pylorus formed a hard tumor like an almond; the surface was anemic but with nothing to suggest inflammation. The serous and muscular coats were incised down to the mucous membrane and the cut edges gaped widely, but there was scarcely any bleeding. Feeding the infant must be resumed very cautiously or there may be considerable trouble. In one case the infant was so hungry that it was given too much at first and the child vomited, but with more scrupulous care and the service of a wet-nurse the child ultimately did well.

The Predetermination of Sex. Siegel¹⁷³ has studied the question of predetermination of sex and believes there is some connection between the state of ripening of the ovum at the time of conception and the sex of the embryo. Records of 300 pregnancies throw some light upon this question. Conception may be divided into four periods: the first to the ninth day after the onset of menstruation, from the tenth to the fourteenth day, from the fifteenth to the twenty-second and the remaining few days before the return, which show so few conceptions that they are omitted. A female child may be expected when the ovum is young, from the fifteenth to the twenty-third day a male child more probably when the ovum is overripe, that is, from the twenty-seventh day of the onset of menstruation to the ninth day following the onset of the next menstruation. During the periods between these times the chances are about even for the male or female child.

The Prophylaxis of Infection in Wards Devoted to Infants. Barbier¹⁷⁴ gives an account of the method employed at the Herold Hospital in Paris to prevent contagion among infants. The nurses wear a veil like the veil worn in the operating room. It is especially important to have a staff of well-trained and exceedingly conscientious nurses. Sterilized folded cloths are placed under the infant's head, and have done away with infections of the head which used to be common. One nurse had charge of the food for all the infants, written directions being given for each; she collects the directions and prepares the food; each wire basket is

¹⁷² Journal of American Medical Association, March 24, 1917.

¹⁷³ Ibid., March, 17, 1917.

¹⁷⁴ Archives de médecine des enfants, January, 1917, No. 1, vol. xx.

marked with the number of the bed and the bottles are prepared at 11 A.M. for the next twenty-four hours. Sometimes infants who are unable to digest cows' milk have done well on ass's milk when breast milk could not be obtained for them. Among 1238 infants the mortality was 35 per cent. and 29.5 per cent. of all the deaths was from typical tuberculosis, confirmed by autopsy.

There were 311 marasmic infants, among them 141 deaths; of these, 62 per cent. were from septicemia. The mortality rate among marasmic children was 15.1, and all of these infants, except about 30 per cent., were under six months. In many of them hospital contagion was unmistakably responsible. Marasmic children have very little resisting power, and their skin and mucous membranes predispose to all kinds of infections.

Each child should have a separate cubicle, and infants already infected should be kept entirely separated from others and nurses attending the infected infants should have nothing to do with other marasmic infants.

It is also of great importance that convalescent infants and older children be taken out of the hospital atmosphere as early as possible. None of 46 cases of typhoid terminated fatally, and the writer ascribes this in a large part to the avoidance of milk. Under such feeding the result is exceedingly good.

The Treatment of Collapse with Cyanosis in the Newborn. Goppert¹⁷⁵ calls attention to the fact that healthy infants in the first week of life sometimes present a sudden serious condition of collapse with cyanosis. If the history is studied it is found that the night before the child did not nurse much, and when found it is gasping for breath, but without a cough. Acute sepsis may likewise present a similar picture. Before assuming that either of these conditions are present, the writer gives to the child 100 to 150 gm. of tea to drink; within an hour the child often seems quite well again, if all that has been the matter was the lack of water, which is so frequently present. In young breast-fed babies the balance of water is very unstable and reluctance to take the breast, even for one night or day, may cause such a lack of normal fluid balance that severe disturbances are liable to follow even in healthy children. The recognition of this condition may sometimes save the infant's life.

Phenol Excretion in the Urine of Infants. Moore¹⁷⁶ examined 15 infants to determine the quantity of phenol excreted per kilogram of body weight. He found that it was less in breast-fed infants than in artificially fed children. In both adults and children there is a relation between the total phenol excretion and the intake of protein matter as measured by the total nitrogen excreted in the urine. This relation can be expressed in the general terms that if protein intake be multiplied by three this will double the excretion of phenol. Although the early findings indicated the opposite condition, phenol is quantitatively present in the urine of every newborn infant. The average of the 19 cases studied was 11.2 mg. for the first three days of life. As phenol is present during this period of starvation, it must in part originate from endogenous metabolism.

¹⁷⁵ Journal of American Medical Association, March 3, 1917.

¹⁷⁶ American Journal of Diseases of Children, January, 1917.

DISEASES OF THE NERVOUS SYSTEM.

By WILLIAM G. SPILLER, M.D.

Brain Tumor. Three cases have been reported by Spiller and de Schweinitz,¹ in which removal of a few cubic centimeters of cerebrospinal fluid had a remarkable effect upon the swelling of the optic nerves. In the first patient a decrease of one diopter was noticed after each lumbar puncture. Two of these cases, from a preliminary examination, strongly suggested brain tumor; but after a more careful study the diagnosis of encephalitis was made in one case and of pseudotumor from intoxication or infection in the other.

The first case was one in which a man, aged twenty-six years, had grippe from December 9 to December 16, 1916. On December 29, severe frontal headache began and lasted a few days, but the patient was confined to bed about nine days. Within a few days some weakness in the muscles of mastication of each side developed, frontal headache returned and occasionally vomiting occurred. On January 24 choked disk of 4 D. was found in the right eye and of 5 D. in the left eye. Further examination showed that the right muscles of mastication were very weak, patellar reflexes were feeble and Achilles reflexes were lost. The elevation of each choked disk increased one diopter. The repeated lumbar punctures in this case were followed by prompt improvement in the swelling of the disks, and later complete recovery ensued.

The second case was one in which the symptoms were more strongly suggestive of tumor. The third case was one of thrombosis of the lateral sinus.

It is presumable that the lumbar puncture in these cases acted much as does cerebral decompression. Lumbar puncture is well known to be a dangerous procedure in brain tumor cases, as death has often followed, but where there is doubt as to the possible existence of tumor it would seem, from the first two cases described in this paper, that small quantities of cerebrospinal fluid may be removed by lumbar puncture with little danger and with most beneficial results. A papilledema of five or six diopters is so grave a condition that lumbar puncture, with the withdrawal of a small amount of fluid, even though brain tumor cannot be absolutely excluded would seem to be a safer procedure than the more formidable operation of cerebral decompression, and certainly indicated in preference to temporizing measures.

The question might be raised as to what effect the withdrawal of small amounts of fluid can have. It seems impossible that removal of 2 or 3 c.c. could relieve pressure sufficiently to cause marked relief in

¹ Journal of Nervous and Mental Disease, July, 1917, p. 10.

forty-eight hours, but it is probable that the withdrawal allows adjustment, and that by taking away 2 or 3 c.c. the absorption of the fluid may be brought about in a more normal way.

Cortical Monoplegia. A very remarkable case is reported by Parhon² and Vasiliu. A soldier was shot in the left parietal region and presented a tremor like that of Parkinson's disease, in the right middle, ring and little fingers, with sensory disturbance in these fingers and the inner side of the hand. Operation showed only a fracture of the inner table of the skull without distinct lesion of the meninges. The tremor disappeared in a few days, but paralysis occurred in the same location. Inasmuch as the lesion was believed to be cortical, the question is raised by these authors whether the tremor of Parkinson's disease could have a cortical origin.

Especially interesting, however, was the limitation of motor and sensory disturbances to the ulnar distribution from a cortical lesion, as so limited disturbances from cortical lesions are very rare. Dejerine has mentioned cerebral lesions causing monoplegia limited to the shoulder or to the interosseous muscles of the fingers, or to the thenar and hypothenar eminences. Parhon and Vasiliu describe a case in which apoplexy caused paralysis confined to the thumb and index finger and clonic convulsions of the thumb and face. About a month later the paralysis affected the whole upper limb, with questionable implication of the face. The lower limb was only a little affected. A tumor was diagnosed but operation revealed a hemorrhage of the brain. This case is noteworthy in that at first so small a muscular supply was paralyzed, and about a month was required for the hemorrhage to cause paralysis of the whole limb. Hemorrhage usually works more rapidly.

Their first case mentioned above shows that a cortical lesion may produce symptoms much like those of a lesion of the ulnar nerve, and also shows a close connection between the cortical areas supplying motor and sensory fibers to the same region.

Cortical Facial Monoplegia. This form of paralysis is very rare. Marie and Lévy³ report a case following a shell wound. At first paralysis of the upper limb was associated with the facial palsy, but it lasted only eight days. The facial palsy was slight but was of the upper neuron type. Marie and Foix have reported several similar cases, with or without anarthria and brachial paralysis.

Cortical Sensory Disturbances of Radicular Distribution. These disturbances in objective sensation, assuming a distribution like that of root lesions, but having a cortical origin, have always been considered rare. According to Cestan, Descomps, Euzière and Sauvage,⁴ these phenomena have become more common during the war, and these authors have observed numerous cases and report some in which convulsions occurred in the radicular area of disturbed sensation. In the first case they report a lesion of the right parietal region resulting from the bursting of a shell, and the patient had convulsive movements which began in the left

² *Revue neurologique*, April and May, 1917, p. 156.

³ *Ibid.*, November and December, 1916, p. 513.

⁴ *Ibid.*, April and May, 1917, p. 235.

index and middle fingers and extended to the forearm and arm. The left hand was a little weak, and, while the left upper limb showed impaired sensation, the impairment was chiefly marked along the radial side of the forearm and hand. Thus the convulsive movements in their commencement were in the pseudoradicular region of disturbed sensation.

Their second case was similar. A lesion of the left parietal region, likewise caused by the bursting of a shell, gave rise to sensory epileptic attacks, consisting of paresthesia in the right upper limb where objective disturbance of sensation was most pronounced in the inner side of this limb. In this case convulsive movements were absent.

The third case was one of lesion of the right parietal region, with convulsions beginning in the last two fingers of the left hand and disturbance of objective sensation predominating on the ulnar side of the hand and the external border of the foot. The fourth case was similar.

Hemiplegia. HEMIPLEGIA FOLLOWING OCCLUSION OF THE INTERNAL JUGULAR VEIN. It seems to be true, as stated by Villard and Halipré,⁵ that ligation of the internal jugular vein, with or without resection of the vessel, usually causes no cerebral trouble, but under certain circumstances, not well understood, this procedure causes serious results which may end fatally. These authors report a case in which a knife cut in the neck severed the right internal jugular vein, the cervical sympathetic and the pneumogastric. The man was comatose for forty-eight hours, and was then found to have weakness of the left upper limb and of the lower part of the left side of the face and paralysis of the right cervical sympathetic. The cerebral lesions were believed to be caused by the interference with the return circulation. Villard and Halipré refer to several cases in the literature supporting this point of view. In one resection of the jugular vein caused coma followed by death on the sixth day. The necropsy showed distention of the superior longitudinal sinus and of the veins emptying into it; hemorrhages on the inner surface of the dura and several areas of softening and of hemorrhage in the cerebral cortex.

HEMIPLEGIA FOLLOWING PLEURAL EFFUSION. A case of this character is sufficiently rare to deserve reporting. Turtle⁶ speaks of a man, aged twenty-three years, who had a pleural effusion on the left side, with displacement of the heart. Serous fluid was aspirated, but there was no pus. The dulness soon reached to the clavicle, but improvement began and breath sounds were returning when the man suddenly sat up in bed, gave a cry and fell back. On examination he was found to be hemiplegic on the right side, with complete motor aphasia. The paralysis of the right limbs was complete, but the associated movements of the face could be partially performed on the right side. He was not unconscious at any time and appeared to understand all that was said to him. He gradually improved, the pleural effusion disappeared, but a coarse friction sound remained for some time all over the left lung.

The cause of the hemiplegia was believed to be undoubtedly embolic, a small fragment probably having become dislodged from a clot in the

⁵ Revue neurologique, June, 1917, p. 288.

⁶ Lancet, August 4, 1917, p. 161.

left pulmonary vein. A number of cases have been recorded from time to time of sudden death occurring during the course of pleurisy, with a large effusion, and Turtle thinks it is reasonable to assume that in a proportion of these fatal cases the cause of death has been an embolus from the pulmonary vein or auricular sinus becoming lodged in the internal capsule.

Fracture of the Skull. According to Kearney⁷ a rise in the intracranial pressure above normal as a result of cerebral hemorrhage or edema is usually one of the most damaging factors in cases of recent fracture of the skull. This rise of pressure often may be indicated early by edematous changes in the fundus of the eye. When the recent cases of fracture of the skull are examined for the first time, that is, within twenty-four hours after admission to the hospital, there is usually found a general edema blurring equally all the details in the fundus of the eye, and this blurring may be slight or sufficient to greatly obscure the eye-grounds. In cases uncomplicated by an increase in the intracranial tension, the retinal edema gradually subsides. Increase in the edema should cause lumbar puncture to be performed and the pressure of the spinal fluid should be read by a manometer. When intracranial pressure is much increased, repeated lumbar puncture may be done and the condition thereby relieved. If this pressure is double the normal, or more than double, Sharpe advises a simple cranial decompression to be performed for the relief of pressure and for drainage before a possible exhaustion of the medulla oblongata occurs. The statements made by Kearney are based on the observations of 212 cases of fracture of the skull in the service of William Sharpe.

General Loss of Tendon Reflexes in Injuries of the Skull. Souques and Odier⁸ believe that a general loss of tendon reflexes in skull injuries indicates a mild form of meningitis, and they report a case in which meningitis occurred fifteen days after a head injury with loss of reflexes. The manner in which the meningitis produces this condition is not explained, and the loss of reflexes occurs without pain, anesthesia, Romberg's sign, hypotonia, ataxia, etc. In two such cases lumbar puncture revealed an increase of pressure and of albumin without lymphocytosis, but the punctures were made late. The importance of the areflexia in head injuries is shown in that a diagnosis of tabes may be avoided, and in that it may be the only sign of a previous meningitis.

Muscular Atrophy and Nutritional Changes from Parietal Lobe Lesions. The occurrence of muscular atrophy and other changes in nutrition from lesions of the postcentral cortex has been observed by Guthrie.⁹ Since the beginning of the war cases of injuries of this region have been received at the Empire Hospital for Officers.

He finds that in all cases of postcentral lesions a certain amount of muscular atrophy is noticeable within a few weeks after the receipt of the injury. In unilateral lesions the atrophy is of the muscles of the

⁷ Journal of American Medical Association, October 27, 1917, p. 1399.

⁸ Revue neurologique, April and May, 1917, p. 248.

⁹ Proceedings of the Royal Society of Medicine, Section on Neurology, January 24, 1918.

contralateral limbs, and affects the distal more than the proximal portions of the extremities. It is more marked in the hand and forearm than in the upper arm, and in the foot and leg than in the muscles above the knee. The wasting is in no case excessive. It never approaches the degree of wasting seen in spinal muscular atrophy or in that caused by injuries of the peripheral nerves or roots, but it is sufficient to attract attention as soon as the limbs are exposed to view. The atrophy is of rapid development, but having reached a certain stage it is not progressive. It is usually, perhaps always, preceded by motor paresis, if not paralysis, which passes off in the course of a few days or hours, leaving the affected limbs weak, but capable of all voluntary gross movements, though not of movements requiring delicacy and precision. The weakness is not greater than can be accounted for by the wasting.

After the lapse of some months, and within a year of the injury, changes in nutrition occur. The affected hand becomes smaller and more delicate than the other; the fingers become tapering and the nails long and narrow.

Vasomotor disturbances may be observed in the distal parts. The patient is subjectively conscious of coldness in the affected parts. The postural sense and appreciation of measured movements are always much disturbed, and in the distal more than in the proximal parts, and there are other disturbances recognized as parietal in origin.

Motor paralysis and disuse may be excluded as sole causes of the muscular atrophy and changes in nutrition. Cerebral motor paralysis, Guthrie asserts, does not cause muscular atrophy unless it has been of long standing and is extensive. In these postcentral cases motor paralysis or paresis has been of such extremely short duration that it seems incapable of producing the degree of muscular atrophy present. Even if it be admitted that disuse alone induces wasting of muscles, it cannot be maintained that such a result follows disuse which has only existed for a few hours or days. Guthrie believes the sensory cortex has some special trophic functions which are separate, though closely allied to the other functions which it performs. Some of the centers which govern growth and nutrition may be situated in the postcentral areas of the cortex.

It has been known many years that muscular atrophy may occur early in cerebral lesions, but the merit of Guthrie's observation is that the parietal lobe is specially designated as that part of the brain which exerts a control over nutrition. His paper, as published at present, lacks details, and we do not know whether the actual extent of the lesions was determined in every case.

Macular Cortical Representation. It has been uncertain whether a sharply defined center exists in the visual cortex for macular vision or whether this center extends over the whole visual cortex. Dejerine believed the macular bundle of the optic nerve is represented by a much greater number of fibers in the optic radiations, than those of this bundle, and that these fibers are in connection with the greater part of the visual cortex. Anatomical and clinical observations, he believed, justify this conclusion, as central scotoma of cortical origin has never been

observed, and it would be likely to occur if macular vision were represented in a small cortical area. He acknowledged, however, that the question was not definitely settled.

A few observations have supported the view that macular representation in the cortex is limited, and among these may be included those of Souques and Odier.¹⁰ A soldier was injured in the occipital region by a shell and had, as a result of this injury, macular hemianopsia and paramacular scotomas. Visual acuity otherwise was good and the eye-grounds appeared to be normal. It was evident that a piece of shell had entered the right occipital lobe and had lodged in the anterior part of the left occipital lobe. Both occipital lobes were therefore injured. The case seems to support the theory of partial decussation of the macular fibers.

As a complement to this observation are those cases in which central vision was preserved and panoramic vision was lost from cortical lesions, of which the first was reported by Bramwell, Bolton and Robinson, but the case of Holloway and Spiller also is to be mentioned in this connection.

Cerebrocerebellar Diplegia. Clark¹¹ has employed the term cerebrocerebellar diplegia for a combination of symptoms dependent upon cerebellar agenesis, or some form of injury to the cerebellum, at the time of or before birth, the exact nature of which has not yet been determined. The varying types of the disorder are those of flaccid and flaccid-spastic palsy. In the cerebellar ataxic type there is hypotonia, dysmetria, gross incoöordination, astasia, abasia, dysarthria, occasionally dysphagia and often complete inability to sit up. In extreme involvement of the forebrain, all these cerebellar symptoms are present, with mutism and idioecy. In the mixed types there may be a slight degree of spasticity in certain parts, combined with hypotonia or flaccidity in other parts of the body.

Dana¹² has found there are cases of congenital cerebellar defects without mental symptoms. He had, for example, watched for thirteen years a child, born of neurotic parents, who at eighteen months was noticed to be different in coöordination from other children, and as she grew older her mind developed well, but she was discovered to be ataxic, unable even to sit up, and to have other marks of distinct cerebellar defect. She is now a normal child mentally and physically except for the continued existence of an extraordinary defect in locomotion and equilibrium. He believes that if one were to study carefully the cases of persons regarded as only naturally very awkward and of poor equilibrium, it might be discovered that mild cerebellar defects are a more frequent feature than is supposed to be the case.

J. Ramsay Hunt¹³ thinks the term cerebrocerebellar is an unsatisfactory one, as it is too inclusive and is applied to a group of cases which has been described as the atonic-astasic type (Förster). There are now

¹⁰ *Revue neurologique*, August and September, 1917, p. 45.

¹¹ *Medical Record*, May 5, 1917.

¹² *Journal of Nervous and Mental Disease*, July, 1917, p. 59.

¹³ *American Journal of the Medical Sciences*, April, 1918.

three types of infantile cerebral palsy; a spastic type, an atonic type and a rare cerebellar type. If a classification is made of this large and bizarre group of infantile cerebral affections, one should adhere strictly to clinical subdivisions, and such a term as cerebrocerebellar does not tend to clarify the situation, as it would include a group of cases referable to the frontal lobe (Förster type) as well as the cerebellar type. In two cases of the atonic type, Förster has demonstrated the existence of a lobar sclerosis of the frontal lobes while the cerebellum was macroscopically normal in both cases. While in the cases reported by Clark there are symptoms suggesting a cerebellar origin, it must be acknowledged that cerebellar symptoms also arise from frontal lobe lesions.

Hunt¹⁴ prefers the name of ataxic type of cerebral birth palsy, which is in marked contrast to the spastic form and the atonic forms, although it resembles in many ways the cerebellar type. He reports 3 cases. This type of cerebral birth palsy is characterized by pure ataxia without paralysis or spasticity. There is a history of prolonged or difficult labor, instrumental delivery and injury during birth, followed by retardation and abnormality in the development of motor coördination. Because of this there is difficulty in learning to sit up, walk, talk and to use the hands. All of these acts show evidences of incoördination and ataxia, with a tendency toward gradual improvement. There is static and locomotor ataxia and an incoördination of the upper and lower extremities, which persists in the recumbent posture. There is a moderate degree of hypotonicity and the tendon reflexes are diminished and may be difficult to elicit. The superficial sensations are apparently normal and the special senses are not affected. The speech is dysarthric and takes part in the ataxic disturbances. There is a moderate degree of retardation of mental development, but no gross intellectual defect and no epilepsy. The symptomatology is bilateral and fairly symmetrical, although the symptoms may predominate on one side. The lower limbs are more affected than the upper. There is a tendency to gradual improvement. The gross motor power is well preserved and there is no tendency to spasticity or exaggeration of the tendon or periosteal reflexes. There is a tendency to hypotonicity and diminution of reflex action. There is no nystagmus. The clinical picture is characterized by motor incoördination, which affects the various voluntary movements.

Hunt ascribes this condition to meningeal hemorrhage limited to the parietal lobes, *i. e.*, in the sensory sphere of the cerebral cortex. He believes that during the birth there is thrombosis or rupture in those veins of the cerebral cortex situated in the interparietal fissure, which drain the blood from the parietal lobes. Such a vascular lesion must lie posteriorly to the motor area, and as a result there is disturbance in the development of the cortical centers and commissural system by which muscle memories are transmitted to the motor area.

Meningitis. In a digest of the recent acquisitions to the knowledge of epidemic cerebrospinal meningitis, Verbizier¹⁵ emphasizes the importance of *rigidity of the neck* as an early sign, and suggests that when the

¹⁴ American Journal of the Medical Sciences, April, 1918.

¹⁵ Revue générale de pathologie de guerre, 1916, No. 1, p. 37.

disease is prevalent among troops it would be well to have the soldiers bend their heads forward and backward, individually, so as to detect the first evidence of this rigidity. Some signs of less importance are: The flexion of the leg on the thigh and the thigh on the pelvis when the examiner flexes the other lower limb; the extension of the big toe when the examiner raises the lower limb in extension from the bed, sometimes occurring in the big toe of the limb not raised; the flexion of the lower limbs at the hips and knees when the examiner raises the head; the rapid flexion of one lower limb at hip and knee when the examiner squeezes forcibly the quadriceps muscle of the other limb.

The course of the disease may be exceedingly rapid and limited to a few hours, or it may be so mild as to produce a *forme fruste* in which the diagnosis may be difficult. Lumbar puncture should be done in a doubtful case. The disease is more likely to be associated with convulsions in the child, but in the aged it is more latent, with symptoms less distinct.

The meningococcus may be extracellular as well as intracellular, and in some cases only one or two may be found in a careful search. A positive culture may sometimes be obtained from a fluid that has appeared sterile. The fluid usually is cloudy but it may be clear when recovery is taking place and the cloudiness of the fluid has disappeared, or when the disease has not existed very long.

Under the term *méningites cloisonnées* is meant those forms in which the meningitis is confined to narrow limits. When the pus is confined to the ventricles, the name *pyocéphalie* has been employed. The ventricles are distended by pus and communication with the exterior of the brain is abolished, where the meningitis may be slight. Lumbar puncture is of little use in such cases, and ventricular puncture is necessary. The accumulation of pus may be confined on the surface of the brain or cord. Such a condition may be suspected when there is inability of the patient to absorb the serum, when there is sudden aggravation of the symptoms after the spinal injections, and when the intraspinal serum treatment is ineffectual. The failure to absorb the serum is shown by the yellow color of the spinal fluid removed one or two days after an injection of serum. This serum xanthochromia of the fluid may result from any obstruction to the circulation of the cerebrospinal fluid. When a purulent meningitis exists and a bacterial examination cannot be made speedily, it seems wise to inject intraspinally not only the antimeningococcic serum but also the antiparameningococcic serum.

Herrick,¹⁶ in studying the epidemic of meningitis at Camp Jackson, had 140 cases from which to draw conclusions. In the fulminating cases there has been extensive purpura, with death in from four to ten hours, without the clinical or necropsy findings of meningitis. He does not regard the disease as primarily a meningitis. It is a generalized systemic invasion by the meningococcus with possible secondary involvement of the meninges, joints, pericardium, endocardium, testicles, conjunctiva, sclera, pleura, lungs; from all of which regions, in addition to the tonsils and pharynx, the micrococci have been isolated. In many cases

¹⁶ Journal of American Medical Association, January 26, 1918, p. 227.

the systemic symptoms appear from twenty-four to seventy-two hours before involvement of the meninges. These may be moderate fever, weakness, mild apathy, coated tongue, pharyngitis or coryza and mild digestive disturbance. Headache and other cerebral symptoms are generally absent at this stage.

In about 75 per cent. of the cases in this epidemic, Herrick has found that the petechial rash is the earliest sign of value. In order of frequency, this rash appears on the deltoid regions, hips, trunk, extremities, mucous membranes and face.

The meningococcus can usually be recovered in the spinal fluid withdrawn at the first or second lumbar puncture, and often from six to thirty-six hours before the characteristic clinical picture develops or cellular increase and cloudiness occur in the fluid. Herrick believes the cerebral precedes the spinal involvement, and for this reason, in doubtful cases, recommends that the lumbar puncture should be repeated at intervals of from three to six hours, in order to drain the meningococcus from the brain. Thorough centrifugation and careful examination of the sediment usually reveal one or more pairs of meningococci. At this early stage these organisms are extracellular, and variable in size and appearance. The spinal fluid is clear, has a normal cell content, without polymorphonuclears, usually reduces Fehling's solution, and may or may not show a faint trace of globulin.

Diagnosis in the stage of meningococcus sepsis may be made many hours before the meningococcus has time to develop its characteristic selective action on the meninges. In the epidemic Herrick studied a rapidly developing petechial rash, fever and variable general symptoms, and the finding of isolated meningococci in the spinal fluid have been the important factors in an early diagnosis.

The usual methods of treatment were modified at Camp Jackson. In the stage of sepsis, before meningitis has developed, routine intravenous administration of antimeningococcus serum in doses of 20 to 60 c.c. has been effective, and has in many cases been followed by striking improvement. Such doses have been administered every twenty-four hours during the first three or four days of the disease. Intravenous serotherapy should precede the intraspinal, and, in the cases of primary meningococcus sepsis, it is probable that the intravenous serum administration is of more importance than the intraspinal treatment. The latter must not be neglected, but it is probably best deferred in some cases until the spinal fluid becomes cloudy.

ASEPTIC MENINGITIS. According to Cottin and Demole,¹⁷ all foreign substances introduced into the spinal column cause an increase of the cells of the fluid, and other observers have reported facts which justify this conclusion. The cells at first may be polynuclear and later become mononuclear. Cottin and Demole report the occurrence of symptoms of meningitis following the injection of novocaine into the spinal column with increase of cells in the fluid, and after five days the symptoms disappeared. No organisms were found in the fluid, and the polynuclear

¹⁷ Revue neurologique, August and September, 1917, p. 51.

cells were soon replaced by mononuclear. Such a condition is exceptional, but it seems to have been produced by the novocaine.

TYPHOID MENINGITIS, as shown by the statistics of the medical clinic of the Johns Hopkins Hospital, occurs in 5 cases out of 2768 cases of typhoid fever. Seventeen case reports of this relatively rare phase of typhoid infection are summarized from the literature by Bayne-Jones.¹⁸ These, with the 15 cases collected by Cole and the report of a case by Bayne-Jones, make a total of 33 proved cases of this condition in the statistics of typhoid fever.

MUMPS MENINGITIS. The occurrence of meningitis in mumps, according to Kaunitz,¹⁹ is more frequent in some epidemics than in others. As most patients recover after a few days' illness it is probable that the meningeal condition is lost sight of, especially in the milder cases. Mumps meningitis begins insidiously with constipation, headache and vomiting, and has little, or no, fever, the height of the disease being reached in from twenty-four to forty-eight hours. Although recovery usually occurs, the meningitis may terminate fatally. Kaunitz reports 3 cases under his observation.

TRICHINOSIS SIMULATING MENINGITIS. Trichinæ in the spinal fluid are not likely to cause frequent difficulty in diagnosis, for the condition is rare; but when they do occur an incorrect diagnosis is probable. Jacob Meyer²⁰ has observed the condition in 3 children of the same family, and, in all, the first diagnosis made was epidemic meningitis. In all three meningeal symptoms were present, and in two the spinal fluid showed marked cellular increase; in this respect these cases differed from some previously reported. The fluid also was under increased pressure. The cell count was as high as 240 and as low as 40 per cm. The Nonne reaction was positive, the Ross-Jones's test was negative, and Haines's solution was reduced. The nitric acid test for albumin was negative. These findings indicate meningeal irritation. Kernig's sign may be caused by muscular swelling and edema, but it was present in these cases before the edema developed. The edema was not similar to the ordinary type pitting on pressure, but was rather hard, glistening and board-like, especially over the extremities. Other signs of meningeal irritation were stiff neck, suggestive Brudzinski sign, exaggerated patellar reflex (in one case), headache and vomiting.

Meyer speaks of the resemblance his cases presented to poliomyelitis. One of the children was unable to rise on the examining-room table and stand, unless supported. In the other two children the patellar reflexes were absent. Tenderness was present over the extremities and pain was felt on pressure. The diagnosis of trichinosis may be established by the occurrence of edema, the presence of eosinophilia in the blood picture, and the isolation of the trichinæ from the spinal fluid or muscle.

The high eosinophilia of 50 per cent. in one child and the comparatively low eosinophilia in the other two children, who were extremely ill, Meyer points out is in accord with the observations of Opie, to the

¹⁸ American Journal of the Medical Sciences, July, 1917, p. 55.

¹⁹ Journal of American Medical Association, May 18, 1918, p. 1448.

²⁰ Ibid., March 2, 1918, p. 588.

effect that the more severe the infection the lower the eosinophilia, and *vice versa*.

Lumbar Puncture Headache. An interesting explanation of the headache following lumbar puncture is given by MacRobert.²¹ He states that the pain is present only when the patient is erect, and that it will occur after the removal of a small amount of fluid as well as after the removal of a large amount. To attribute the headache to the amount of fluid lost seems to him ridiculous inasmuch as when probably 60 c.c. or more are secreted in a day an alteration in the intracranial condition sufficient to produce violent headache of seven or more days' duration is not likely to occur from the removal of from 2 c.c. to 5 c.c.

He states that a puncture of the spinal dura usually persists as a clean-edged, round hole. The closure of this hole probably is accomplished by the arachnoid tissue plugging it when the needle is withdrawn. If the puncture hole is not blocked, it is because the delicate arachnoid tissue clings around the departing needle, and is pulled into the hole in the dura. This invagination forms a wick for the easy drainage of the whole cerebrospinal fluid sac, and also prevents the rapid healing, which would otherwise occur, of so small a dural opening. The leakage will be into the epidural space where the fluid can be absorbed readily, because the epidural space of the spinal canal is comparatively large and contains only loose connective tissue, with venous plexuses and lymph channels.

This explanation satisfies for such an occurrence as a lumbar puncture headache when no fluid has been obtained. A headache which comes on when a patient sits up, and disappears when he lies down, must obviously be mechanically produced.

Syphilis of the Nervous System. Some interesting facts regarding syphilis are mentioned by Camp.²² The Wassermann reaction of the blood is frequently negative in children born of syphilitic parents and remains negative until the development of syphilitic manifestations. He has found a negative Wassermann reaction in the blood and in the spinal fluid in parents, with positive findings in the child of those parents. It is important, therefore, not to be led astray by negative findings in the parents.

SYPHILITIC LESIONS OF PITUITARY BODY. It seems that syphilis, according to Lereboullet and Mouzon,²³ has seldom been found as a cause of pituitary symptoms, and a case in which hereditary syphilis appeared to be the cause of such symptoms is reported by these authors. It was one in which a man, aged twenty-three years, had the appearance of a boy of fourteen. He had bilateral optic atrophy and left temporal hemianopsia. Inequality and rigidity of the pupils of the father, defects of the teeth in the patient and in his brothers, and lymphocytosis of the spinal fluid of the patient suggested syphilis as of etiological importance, even though the Wassermann reaction was negative. One may, however,

²¹ Journal of American Medical Association, May 11, 1918, p. 1350.

²² Journal of Nervous and Mental Disease, November, 1917, p. 370.

²³ Revue neurologique, June, 1917, p. 493.

question the statement that syphilis is so infrequently found as the cause of pituitary disease.

PREGNANCY AND TABES. It is probably a correct statement that pregnancy is less common in tabetic women, and the explanation, according to E. M. Allen,²⁴ is because tabes occurs about ten times more frequently in men than in women, because decrease of sexual desire and power may be an early symptom of tabes, and because a majority of the cases occur between the thirtieth and fortieth years of life, when the frequency of pregnancy is waning. It seems that when pregnancy does occur, the delivery may be normal and painless. In a case reported by Allen the interesting features were the spontaneous onset of the indolent labor of probably seventy-two or more hours' duration, the absence of pain until the head was on the perineum, and then less than might be expected, and the promptness and efficacy of the action of pituitary solution.

PSEUDOPARESIS. It is well to call attention to one of many effects of physical exhaustion in war service which may be a pseudoparesis. This J. Ramsay Hunt²⁵ has done. He was assigned to one of the officers' training camps to make neuropsychiatric examinations. There were about 1500 men in this camp, and 21 men were recommended for discharge, as suffering from disease of the nervous system of sufficient gravity to incapacitate them for the responsibilities and duties of military life. Of this number 9 were examples of functional nervous disease and should be classed under neurasthenia, the psychoneuroses, etc. Eleven cases showed evidence of syphilitic disease of the central nervous system in the form of incipient paresis or early cerebral syphilis. The symptoms were slight, and consisted merely of pupillary changes, tremors of the face and hands, and slight disturbances of articulation on repeating test phrases. Evidences of mental deterioration were unimportant.

It is interesting to read that in all these instances of syphilitic disease the men were able to perform their duties in the camp, some with considerable satisfaction to the commanding officers. They made no complaint of physical illness. In all these cases the syphilitic nature of the affection was confirmed by serological examination of the blood and cerebrospinal fluid. Hunt is quite right in pointing out the seriousness of permitting such men to take command over others, and the army recognizes the correctness of this point of view.

Another group of cases, 4 in number, claimed his attention because of their resemblance to the paretic cases. In 3 of the cases the clinical diagnosis of paresis seemed fairly certain, and the fourth case, though doubtful, was very suspicious; yet serological examinations of the blood and spinal fluid were normal, and all symptoms disappeared after a week or ten days of rest.

Hunt believes the condition was dependent on an exhaustion of the cerebrospinal centers, producing the clinical picture of paresis, and it was recognized only by the negative serological findings and the speedy improvement. These fatigue symptoms may easily lead to the unfor-

²⁴ Journal of American Medical Association, September 22, 1917, p. 979.

²⁵ Ibid., January 5, 1918, p. 11.

tunate diagnosis of paresis, and on the other hand, when one is familiar with them he must be careful to avoid mistaking true paresis for fatigue manifestations.

These fatigue cases were characterized by pupillary changes, tremors and disturbances of articulation. The mental and cerebral symptoms were not marked in any of the cases, but in 2 cases there were slight mental dulness and apathy, in another excitement and euphoria, and such symptoms were found as headache, vertigo, insomnia, depression and nervous irritability. Hunt thinks that in addition to nerve exhaustion, a low-grade intoxication of the nerve centers from fatigue products must be considered as a possible explanation of the symptoms.

INTRASPINOUS TREATMENT OF PARESIS. The report of Evans and Thorne²⁶ does not encourage us to employ the intraspinal administration of salvarsan or neosalvarsan in paresis. They have tested the method during three and one-half years on twenty-three patients. The patients were regarded as unquestionably paretic. The diagnoses were based on the histories, mental symptoms and physical signs, and were confirmed by the laboratory findings. In selecting the patients those were chosen who were least advanced in the disease and were in the best physical and mental condition. The Wassermann reactions were positive with the blood serum and with the cerebrospinal fluid in each case, and the globulin and cell count of the latter were above normal. The largest number of intraspinal treatments given to one individual was ten and the smallest number three. Three of these patients showed mental and physical improvement; two died during the course of the treatment; two died ten and thirteen months respectively after treatments were discontinued; the remainder showed no improvement whatever. Their conclusion is that the intraspinal method of treating paresis has had little, or no, therapeutic value in their series of cases.

A further report on the treatment of paresis by the intraventricular injection of salvarsan is made by Hammond, Sharpe and Smith.²⁷ They selected only those patients who undoubtedly had paresis, and in all cases the results of the examination of the spinal and ventricular fluids were carefully studied both before and after each injection. In none of their cases were there any symptoms of an alarming nature after the injections. Few patients showed even a slight rise in temperature, and none remained in bed longer than three days. The paper now presented is based on the results obtained in their first 13 consecutive cases, in all but 2 of which three injections were given, and in 2, five injections each. Two of the 13 patients died months after the final injections in the terminal stage of paresis. Two other patients, one of whom received only one injection, were unimproved and have been committed to asylums. The remaining 9 have shown decided improvement, not simply in the serology, but from a clinical stand-point. They are much less emotional, their memories are better, they are improved physically and mentally, and they are still improving.

In 5 of the 9 the improvement has been exceptional. These patients

²⁶ New York Medical Journal, September 8, 1917.

²⁷ Journal of American Medical Association, July 7, 1917, p. 23.

have been able to return to their work and are self-supporting. These authors are conservative in their statements, and properly desire that a period of three years, and possibly of five years, shall have elapsed before they are willing to speak of cures. The harmlessness of the operation and the excellent results so far obtained lead them to urge that this form of treatment be universally adopted in the early stages of paresis. They do not believe it has any effect in even retarding advanced cases.

The blood serums, the cerebral fluids and the spinal fluids of 11 patients with paresis undergoing intraventricular treatment with neosalvarsanized or salvarsanized serum were examined at irregular intervals, before treatment, after the first treatment, after the second treatment, and after the third treatment. Some patients have been examined after a lapse of four to eight months. The fluid changes were either *nil* or so slight as to be negligible in most instances.

Cotton and Stevenson²⁸ recommend again the intracranial treatment for paresis. They had some success in treating paresis with the original method of Swift and Ellis, and about 33 per cent. of the patients treated were distinctly benefited and enjoyed remissions of from two to four years and a small number are still in a normal condition. They acknowledge that it was soon apparent that this method had its limitations, as the effect was not permanent and relapse occurred. The dosage in the intraspinal method is very small and given at too long intervals, and the salvarsanized serum becomes very much diluted by the spinal fluid. It is probable that a large amount of serum is absorbed by the spinal cord and never reaches the cortex. There may be adhesions at the base of the brain which would prevent the serum from reaching the cortex.

They have given serum prepared by the Swift-Ellis method, as well as the serum by the Ogilvie method, and also the bichloride of mercury serum after the method of Byrnes. Some patients have benefited by all methods but they feel that the least efficacious is the mercury serum, and the most efficient is the Swift-Ellis serum. While they cannot believe that the intravenous administration of salvarsan alone is sufficient to effect a remission, even if the spinal fluid is drained, as advocated by some, at the same time they feel that it is absolutely necessary. The cases which have had the combined treatment, both intravenous and intraspinal or intracranial, certainly do much better than those in which no intravenous injections have been given. For this reason they do not believe that the Ogilvie serum alone is to be recommended.

One advantage of the intracranial method is that one can give a much larger dose of salvarsan, than by the intraspinal method, for in the latter method because of the sensitiveness of the spinal cord, and the danger of producing serious damage, only a very small dose of salvarsan can be given, and only at two-week intervals. On the other hand, with the intracranial method a much larger dose of salvarsan can be given and often once a week, especially if the subdural route is used. They now give from 0.3 to 0.6 gm. of salvarsan intravenously and prepare the serum in the usual manner and then they reinforce this serum by adding

²⁸ Journal of Nervous and Mental Disease, April, 1918.

0.25 to 1 mgm. of salvarsan for intracranial use. They have also given 0.25 to 1 mgm. of salvarsan in normal salt solution, at weekly intervals, but have not used this method long enough for any conclusions to be submitted at present.

They have modified the methods of intracranial treatment, both the intraventricular and the subdural, so that the time necessary for these operations has been materially reduced. In the first place they do not give a general anesthetic, but now merely cocaineize the scalp with a 4 per cent. solution of cocaine. An incision is made over the bregma either on the right or left side of the head and about a finger's breadth from the median line. A semicircular flap is then made and the periosteum is separated from the bone. For making the trephine opening into the skull they use an Albee electric drill with a Martel attachment which prevents any injury to the dura. After the dura is exposed a small incision is made and care taken not to sever any dural vessels, and then a modified Cushing brain canula is introduced through the dura and then through the brain cortex, and when the ventricle is reached the plunger is withdrawn and the fluid allowed to flow out. During this stage of the operation the head of the table is lowered to facilitate the flow of the fluid. After sufficient fluid has escaped, the serum is then introduced through the canula into the cortex, from a syringe and then the canula is withdrawn, and the scalp flap is sutured. The patient is able to get up from the table unassisted and walk out of the room. He is told to lie down for a little while if he feels any effects from his treatment, but usually there are no after-effects. This operation is simple and rarely takes more than nine minutes from the opening of the flap to the closing of the flap and the end of the operation. The patient feels no discomfort and frequently converses with the physician. The Albee drill does not occasion any pain but is at times uncomfortable for the few seconds necessary for boring the skull. They have treated from 10 to 15 cases a week for the last year by this method and have only had 1 case in which it could be said that the treatment was responsible for the death of the patient. In this case the disease was of long duration, and the treatment had been successful. There was nothing out of the ordinary in the last treatment and the man went home as usual in the afternoon. The next morning he went down town and there had a convulsion and became comatose. He rallied and lived for more than ten days, but finally succumbed, and an autopsy was not obtained. It was difficult to decide the exact cause of death in this case. The patient was doing very well before the last treatment and a favorable outcome was expected, but the course of paresis is so uncertain and varied that they believe he might have had the shock even if he had had no treatment. But as the shock came on a short time after the treatment they admit a possible relation. This is the only case in which any serious trouble arose, so that they assert that the intracranial method is not any more dangerous than the intraspinal method.

The conclusions to which Cotton and Stevenson come after four years' experience are:

1. That the intracranial (either the intraventricular or subdural)

method is the most efficacious method in the treatment of paresis and should be the method of preference.

2. That the intraspinal method is the most efficient one for the treatment of tabes and luetic meningitis.

3. That salvarsan is the best drug for the treatment of cerebrospinal syphilis and preferable to diarsonal and other substitutes.

4. That the mercurialized serum of Byrnes is of doubtful value, as it is not of sufficient potency to destroy the spirochete.

5. That the success of any method of treatment depends upon the stage in which the disease is treated, and the earlier the stage the better the outcome of the treatment. Therefore, if possible, the disease should be diagnosed in the preaparetic stage or as soon as symptoms are present.

6. That in every case of syphilis an examination of the spinal fluid should be made at frequent intervals after all symptoms of the acute stage are over, especially if the blood Wassermann remains positive after sufficient treatment has been given.

7. That all cases of paresis can be arrested and possibly cured if treatment is begun early enough.

8. That physicians should be taught to recognize the importance of an early diagnosis and trained to make such a diagnosis, so that cases can be referred for treatment before the process has gone too far for treatment to be effective.

9. That the treatment of paresis should be undertaken by all institutions for the insane, and all cases treated, as it is a difficult matter to decide whether a given case has reached the stage when treatment would be useless.

Sachs²⁹ has expressed himself forcibly against the intraspinal injections of salvarsan, and recently he has again stated, that the method has achieved nothing that could not be obtained by the intravenous method. There has been no danger to life in the latter method in Sachs's hands, but he asserts that no one who has had much experience with the intraspinal form will deny that often enough serious results follow this method of medication, and, even if life is not actually in danger, as it sometimes is, paralyses and serious vesical disturbances often ensue. Sachs doubts whether a single case of paresis has resulted in cure by the intraspinal method, and the remarkable reduction in the number of the lymphocytes and the change in the Wassermann reaction have followed on intravenous injections, or repeated lumbar punctures, and on the introduction of the patient's non-salvarsanized serum. He is certain that there is no correspondence between a change in the cerebrospinal content and the condition of the patient. He can refer to patients in whom after both intraspinal and intravenous treatment for paresis or tabes there has been no change in the Wassermann reaction or in the number of cells in the cerebrospinal fluid, and yet the patient has shown most satisfactory improvement in his general condition.

The views of Sachs are strongly rejected by Fordyce,³⁰ and he says that should they be accepted by the medical profession, great harm

²⁹ Journal of American Medical Association, September 1, 1917, p. 681.

³⁰ Ibid., November 3, 1917, p. 1482.

would result in that numerous victims of syphilis of the nervous system would be deprived of their only chance to regain health. Several of Sachs's statements are at variance with the experience of Fordyce and his colleagues, who have employed spinal treatment over a period of years. They have seen numerous patients, treated for months intensively by salvarsan, given intravenously with little or no clinical improvement, entirely relieved of tabetic pains, crises, bladder symptoms and sexual impotence, and with a marked improvement in their ataxic gait after the institution of intraspinal treatment. Intraspinal medication is indicated when the symptoms and serological findings are unchanged after a fair trial of intensive intravenous treatment. Fordyce has had cases in which the blood Wassermann became negative, but the spinal fluid remained positive after intensive extraspinal treatment, and he assumes that the choroid plexus does not permit the remedy to enter the fluid. This assumption is supported by the rapid improvement that follows intraspinal injections.

Long-continued intravenous and intraspinal therapy has demonstrated to Fordyce that paresis, in the stage which comes to the neurologist, cannot be cured by any method. Its course may be modified more rapidly, and longer periods of remission may be secured by intraspinal treatment than by any other. It is questionable if this delay is an advantage to the patient or his family.

Sachs's statement that the same biological changes in the fluid have followed intravenous treatment, or repeated lumbar punctures, or the introduction of the patient's non-salvarsanized serum, Fordyce absolutely denies. He has had numerous cases of spinal fluid examination in which no change occurred after the introduction of non-salvarsanized serum, and he does not believe a single case can be presented in which the Wassermann reaction in the spinal fluid has been influenced by non-salvarsanized serum or repeated lumbar puncture. The cytology of the fluid may be changed by repeated lumbar puncture, but the other phases are not so influenced. As regards intravenous treatment, Fordyce says it has never been denied that the same fluid changes may be brought about in certain cases. Those who uphold the advantages of intraspinal treatment maintain, and have demonstrated beyond any doubt, that in cases not influenced by intravenous treatment the intraspinal treatment yields positive results. This is the entire contention, and not that one method or the other can accomplish similar results in unrelated cases.

Fordyce maintains that he can demonstrate at least 100 cases in which there is a very direct relationship between the various phases in the cerebrospinal fluid and the patient's condition. He urges persistent treatment until negative fluid findings are obtained or a positive Wassermann reaction in the high dilution of the fluid, with a paretic curve, indicates approaching paresis. He gives a technic which he believes is free from serious danger. Low tabes, with advanced degeneration, will tolerate only the smallest doses, or is best treated by the original Swift-Ellis method. In high tabes, or when the degeneration is of light grade, and in paresis, relatively larger doses can be used and at more frequent intervals. Less irritation is produced and more benefit if

about 20 to 25 c.c. of fluid are allowed to accumulate in the receptacle attached to the spinal puncture needle and salvarsanized serum is added to it.

During the past three or four years Fordyce says that he and his assistants have given hundreds of injections, with no deaths, and with no more serious symptoms than those that follow an ordinary lumbar puncture. Many patients prefer the intraspinal treatment to intensive intravenous treatment, as the constitutional reaction generally is less marked. The intraspinal treatment can be used for patients who have lost their tolerance to salvarsan intravenously or who have developed arsenic dermatitis, nephritis or hepatitis. In acute cases of early meningitis he regards it as the method of choice. It is not difficult to select individual cases in which the Wassermann and globulin reactions are unchanged after prolonged treatment, but conclusions based on such exceptional cases are one-sided, unfair and fail entirely to interpret or correlate the fundamental principles involved. If reliance is placed on clinical improvement alone as a criterion of the action of our remedies and the fluid changes disregarded, few if any permanent cures will be achieved, and sooner or later the patient will relapse. The future of the syphilitic individual and the hope of anticipating or arresting the incurable degeneration is largely dependent on early and systematic examination of the spinal fluid.

TREATMENT OF TABES BY THE MALONEY METHOD. In the opinion of H. F. Wolf,³¹ the Frenkel method of reëducation of tabetics is incorrect in every feature. It is wrong to allow a patient to control the more or less automatic action of walking by his eyes, as is done in the Frenkel method, because anything which catches his eye and diverts his attention or interferes with vision, as a bad light, upsets the established control. There are two basic principles on which Maloney has founded his treatment, *viz.*, relaxation and reëducation. A tabetic patient is conscious of the lack of natural control when he is walking, and tries to compensate for it by keeping all his muscles, even those that are not needed for the particular action, in a tense state. Relaxation is needed in reëducation therefor.

Wolf states that he has never known the deep sensibility of tabetics to improve under the Frenkel method, but he knows that it has done so under the Maloney method. Sensation is not entirely lost, even in advanced tabes, although a first examination may cause one to believe that sensory nerve fibers have entirely disappeared. Impulses through the few fibers that remain may be so slight that they are of no use to the patient, and he neglects them altogether. If this patient should be blindfolded, full relaxation induced and attention directed to one particular joint, after a certain time the passive motion which was not perceived at first may be distinguished. These impulses are so slight that the patient does not notice them and would not learn to notice them if he were not blindfolded, or if anything distracted his attention. It is desirable, therefore, that the treatment should not be given in the

³¹ New York Medical Journal, July 21, 1917, p. 121.

presence of others. One joint after the other is taken up in this same way in order that the sensibility should be revived. The patient is placed in a reclining position and relaxes. The treatment is usually begun with the ankle-joint. The foot is grasped with one hand and moved gently up and down. If the patient does not recognize the movement he is asked to focus his attention on any sensation he may have in that foot. After a number of movements he will say that he feels something, and he is taught which movement this sensation indicates, so that he gradually learns to associate sensation with movement. These exercises are performed with all the joints, and, as soon as the patient has learned to interpret sensation properly, much progress is made, and active and resistance movements may then be employed. Wolf explains the fact that blind tabetics often are less ataxic by the statements made above.

Resistance movements must be graduated according to the strength of the muscles; the strength of the weak one must be educated to the strength of the stronger one to produce the proper balance. Only after sensation has been improved can crawling and walking exercises be employed. The patient is allowed to crawl on his hands and knees, gradually he is allowed to walk on his knees, and then to walk in the usual way. The treatment should be given twice a day about an hour each time so that the services of an attendant are necessary.

Tumor of the Spinal Cord. Elsberg's³² experience in spinal cord surgery has shown that in extramedullary tumors which develop under a slip of the dentate ligament, root pains are often missed among the early symptoms. The explanation for this is to be found in the anatomical relations between the dentate ligament and the posterior roots. The ligament lies in front of the posterior roots, and the latter are to a considerable degree protected against pressure from in front by the interposed dentate ligament.

Large tumors are softer than the small ones, and are less likely to cause marked cord symptoms until the growth has attained a very large size. The small tumors are often very hard, and rapidly exert considerable pressure on the cord. Some of the large tumors do not cause pressure upon the nerve roots for a long time, and in such cases root pains as early symptoms are often wanting. Root pains are relatively infrequent in the large soft growths which surround the roots of the cauda equina. It is surprising how little pain is complained of by a patient in whom the lower end of the spinal canal is filled with soft tumor growth which surrounds and envelops all of the nerves of the cauda equina.

When the tumor lies in the midline of the cord on its posterior surface and has not obtained sufficient size to compress the origins of the posterior roots, there may be no pain. Excepting for the lines of attachment of the posterior roots, the spinal cord is not sensitive to pain and the explanation for the painless early course in some patients with small extramedullary new growths is to be found in this insensitiveness of the cord tissue.

³² American Journal of the Medical Sciences, June, 1917, p. 781.

Early root pains may occur in intramedullary spinal tumors, and Elsberg has seen localized swelling of the cord from the growth under a posterior root so stretch the root as to cause root pains among the earliest of symptoms. He does not dispute the widely accepted teaching that early root pain is most frequent in extramedullary tumors and is relatively rare in intramedullary tumors, but the exceptions to this rule are so numerous that one cannot rely upon pain alone to differentiate between diseases which begin outside of or within the cord tissue.

SPINAL FLUID WITH TUMORS. The conclusion reached by Elsberg and Rochfort³³ regarding changes in the cerebrospinal fluid are:

1. Xanthochromia is strongly suggestive of spinal cord tumor in the lower thoracic and lumbar regions.
2. The combination of yellowness, high protein content, spontaneous coagulation and pleocytosis (Froin's syndrome) is characteristic of the large endotheliomas or sarcomas which surround the conus and roots of the cauda equina.
3. Nonne's syndrome (increase of globulin, without increase of cells) is suggestive of extramedullary spinal cord tumor.
4. Increase of globulin without increase of cells plus yellow discoloration of the fluid make the diagnosis of extramedullary spinal cord tumor very probable.
5. The changes in the fluid may be a valuable aid for the differentiation between spinal diseases in which operative interference may be necessary.
6. The diagnosis of a spinal disease should never be made from the spinal fluid findings alone; the results of the examination of the fluid obtained by lumbar puncture should be used only as a diagnostic aid.

SPINAL CORD LESIONS FOLLOWING PERIPHERAL LESIONS. Symptoms of spinal cord lesions from injuries in some part of a limb are difficult to explain, and some of the reported cases afford scarcely more than a *post hoc* argument. For example, Sorel and Gelma³⁴ report a case in which a severe blow upon the left hand caused it to become swollen and painful, but produced no cut. Three months later atrophy became evident, the power then gradually diminished, and the atrophy increased. Reaction of degeneration was obtained in this hand, the tendon reflexes were exaggerated and the Babinski reflex was positive on the left side. An explanation of this case is not given, but the lesion was supposed to be spinal, a degeneration of the pyramidal tract. Some disturbance of sensation suggested syringomyelia or hematomyelia. Whatever may have been the spinal lesion, the authors attribute the atrophy to the injury of the hand in some way affecting the spinal cord.

A very similar case is reported by François.³⁵ Muscular atrophy of the feet and legs of the Charcot-Marie type followed small suppurating wounds of the feet, and the symptoms, as in the previous case, suggested a spinal cord lesion.

Jacksonian Convulsions in Multiple Sclerosis. Patrick³⁶ states that while applectoid attacks belong to the banal symptomatology of

³³ Journal of American Medical Association, June 16, 1917, p. 1802.

³⁴ Revue neurologique, April and May, 1917, p. 233.

³⁵ Ibid., p. 246.

³⁶ Journal of Nervous and Mental Disease, March, 1918, p. 176.

multiple sclerosis, epileptic or epileptoid seizures seldom have been recorded, and mention of Jacksonian fits is scarcely to be found. An extensive examination of the literature by Patrick revealed only 1 case, though Mueller mentions having seen 2 cases. Patrick reports a clinical case. In the absence of necropsy the diagnosis is not certain, but the clinical course and physical findings were regarded as characteristic of multiple sclerosis. As he says, in view of the manifold manifestations of multiple sclerosis and of the fact that the plaques not rarely invade the cerebral cortex, it is surprising that such hyperkinesias are not more frequent. The case is worthy of record because the rarity of focal fits in multiple sclerosis might be a factor in leading one to an erroneous diagnoses of brain tumor or other operable lesion.

Laminectomy in Fracture of the Spine. A recent discussion on this much-discussed subject occurred at a meeting of the New York Neurological Society. Elsberg expressed the opinion that in fractures of the lumbar vertebrae in which the roots of the cauda equina are affected, laminectomy should always be performed early. He believed there is considerable evidence to show that regeneration of the divided caudal nerves occurs and therefore a laminectomy, with suture of the divided nerve ends, should be performed within a week of the occurrence of the injury. Extreme conservatism is indicated in those patients with signs of complete transverse lesion, but one could be too conservative with patients having signs of an incomplete lesion of the cord, and many of them should be operated upon early, within the first week of the injury, unless the signs of interference with function were slight, the general condition of the patient poor, or unless other severe injuries precluded operative interference.

Alfred S. Taylor³⁷ believed the question of operation depended on the type of fracture of the spine and the resulting lesions of the cord. It is impossible to determine always at the beginning of the symptoms whether or not there is a permanent complete transverse lesion of the cord, as with many apparently complete lesions spontaneous improvement occurs after weeks or months. The decision for or against immediate operations, therefore, cannot be based upon the presence of symptoms indicative of complete transverse lesion. It is undesirable, according to Taylor, to subject fractured spines, where the vertebral bodies are involved, to early operation, that is within the first week after the accident. He favors late operation in selected cases.

Lambert and Starr agreed that the dura should not be opened in many cases, if there is pressure sufficient to be relieved by such operation, that pressure has or has not destroyed the cord. If it has accomplished such destruction, opening the dura would do no good because the destroyed cord would flow out through the opening in a mass. If the cord is injured by pressure from without, by relieving the pressure one has done all that is possible. There is only one exception to this; if, when reaching the dura, there is evidence of hemorrhage within it, by puncturing the dura with a hypodermic needle the bloody fluid can be withdrawn

³⁷ Journal of Nervous and Mental Disease, April, 1918, p. 269.

without opening the dura. There is no doubt that all the speakers are correct in saying that cervical lesions are more serious in prognosis, but that is from the paralysis of the diaphragm, its spinal center being affected. Lumbar fractures do not injure the cord to any extent, as the cord ends at the first lumbar vertebra. Fractures of the lumbar vertebrae affect the cauda equina and are to be treated as peripheral nerve injuries and should be operated upon early; this might relieve a great amount of hemorrhage, or get rid of a clot lying in and around the cauda.

Poliomyelitis. In the clinical study of 717 cases of poliomyelitis during the epidemic of 1916 in Philadelphia by Weisenburg,³⁸ some interesting facts are given. The fever charts were remarkably similar, so much so that it was often possible to make a differential diagnosis between infantile paralysis and various other diseases by a glance at the charts. The fever was moderate, 100° to 103° F.; in a relatively few cases, mostly in very young children, it was higher, but rarely above 104° F. Lumbar puncture tended to cause a rise in temperature. In most of the non-fatal cases the temperature reached normal by gradual decline on the sixth or seventh day of the disease.

The so-called abortive cases usually had a shorter febrile period. The so-called toxic cases—if death did not occur, and usually it did not if the febrile period were passed through—showed sometimes a longer duration of fever, but the period was seldom more than seven days in uncomplicated cases. Weisenburg states that he cannot recall a single case, either with or without exacerbations of fever, where the paralysis became more marked after improvement had begun.

With remarkable uniformity the paralysis came on about the second or third day, only rarely was it deferred; and in the great majority of instances pain in the back of the head and neck, with rigidity, came on with the paralysis. It was possible in the early cases, even in the smallest children, to tell which limb was paralyzed by the fact that it was painful on manipulation. In adults the pain came on, in the majority of cases, after their admission to the hospital and after the paralysis had set in.

The paralysis in this epidemic was severe. In the majority of cases it involved more than one limb. It is a striking statement that in the paralysis of the upper limbs the first weakness was always present in the shoulder group and rapidly extended downward. There was no instance in which the paralysis began in the lower part of the upper limb and ascended. In the progression of the paralysis in the lower limbs the paralysis also began in the proximal portions, in the muscles of the pelvis and thighs and extended distally. Weisenburg did not observe a single case in which the paralysis started in the parts below the knee and extended upward.

In some of the cases the limbs were rigid and the reflexes prompt, and ankle-clonus and Babinski sign were present. These signs were almost always the result of meningeal complication with an increase

³⁸ Medical Clinics of North America, September, 1917, p. 393.

of cerebrospinal fluid, for almost invariably, with lumbar puncture, the hypertonicity, clonus and Babinski sign disappeared.

He argues against the contagiousness of the disease, as whenever more than one member in a family showed symptoms they appeared within one or two days of the first infection, this and other arguments he offers to support his view-point that the disease is not spread by personal contact.

Complete Transverse Lesion of the Thoracic Region of the Cord. The war has given the opportunity to study injuries of the nervous system in large numbers and to draw conclusions more valuable than was possible in times of peace. Thus, Guillain and Barré³⁹ are able to report the clinical findings in 15 cases of complete transverse lesion of the thoracic cord. The paraplegia was not regularly, even at first, with hypotonia. The tendon reflexes were usually abolished (in 13 out of 15 cases), according to the law of Bastian, even to death, but the plantar cutaneous reflexes were almost always with flexion, and the movement was slow. The reflexes of defense were usually absent, or, if present, were very feeble and only exceptionally produced by irritation above the dorsum of the foot. These investigators never found withdrawal of the lower limb on the slightest elevation of the knee. The cremaster reflex was preserved frequently, but the abdominal reflexes less frequently. Anesthesia was complete, but the upper borders of the different types of anesthesia were not all at the same level. Retention of urine was the rule, but incontinence of the bowels was more common than retention. The paralyzed lower limbs almost invariably showed an elevation of temperature which increased toward the feet and was probably the result of vasomotor paralysis.

Much has been written on the reflex functions of the completely divided spinal cord in man. Riddoch discusses the vexed question of whether or no the spinal cord in man, when completely disconnected from brain control, can function by itself; and, if the reflex activities are preserved, whether these compare at all with those known in the spinal animal.

Riddoch⁴⁰ bases his paper on observations made during the last two years on many cases of spinal injury, in 8 of which, as proved at operation, the cord had been totally transected. He gives evidence to show that not only can complicated adapted acts be performed by the parts controlled by the isolated cord segments, but also that they follow the same principles which, according to Sherrington and others, seem to guide the reflex activities of spinal animals. His patients were all healthy young adults; the transection of the cord was in each case sudden, in that the lesion was produced by rifle or shrapnel bullets, or by pieces of shell-casing travelling at high velocity; in each case complete anatomical division of the cord was demonstrated either at operation or at autopsy; and the effect of toxic febrile complications from urinary infection, wounds, bed-sores, etc., was taken into account.

Immediately after the bullet wound, as described in one case used as an example for all, the body seemed to be cut in two with dramatic

³⁹ *Annales de médecine*, 1917, vol. iv, No. 2, p. 178.

⁴⁰ *Brain*, 1917, xl, 264.

suddenness. The man was alive with a body which consisted of a head, a neck, arms and the upper part of a chest. Legs and abdomen were non-existent to him. The shock had not affected the brain and proximal part of the spinal cord, for his mind was clear and he was unaware of any difficulty in breathing or of any abnormal action of the heart. The paralysis of the lower limbs for motion and sensation was complete and flaccid, and all reflexes were lost.

Such was the clinical picture for twenty-two days and then a second stage was entered upon. The tendon and cutaneous reflexes began to appear. A flexion reflex could be evoked in either leg. The bladder-wall, and at about the same time the rectal wall began to function, and urine was voided at irregular intervals. The patient began to sweat from the nipples down and from the palms of the hands. Bed-sores healed with suitable attention.

This stage of reflex activity Riddoch states may go on for months or indefinitely, but as a rule intercurrent affections modify it or bring it to a close. Should toxic absorption begin early, as from a severe septic wound or from a sloughing bed-sore, or acute cystitis, while the spinal cord is still under the influence of "shock," its functional activity may recover to a very indifferent degree. The clinical picture will then closely resemble that described by Bastian as being characteristic of complete transection of the cord. The limbs are flabby and almost devoid of tone, they waste rapidly and the only sign of reflex activity evident in them is a feeble flexion reflex following intense nocuous stimulation of the sole. Involuntary spasms are absent and knee- and ankle-jerks cannot be obtained. Automatic evacuation of the bladder and rectum never appears, or at best very imperfectly.

More frequently the picture is blurred later when reflexes have appeared and are in full swing. Urinary infection, so common a complication of spinal injuries, may not give rise to general symptoms of toxemia for weeks after the illness has begun; but one attack often leads to another, to kidney involvement and to death. The paralyzed muscles tend to waste and to lose tone, reflexes that have newly appeared cannot be evoked, the vitality of the tissues is lowered and bed-sores appear or increase in size.

If the attack of infection is not severe, reflex activity returns as the general symptoms subside, and soon the legs fall into spasm as vigorously as ever. Each attack leaves its mark on the nervous apparatus and muscles, and finally the last stage is reached which is clinically an accentuation of the first. All signs of reflex action cease, tone in the sphincters disappearing last.

It is important to note that, provided intercurrent disease does not blur the picture, muscular wasting is almost entirely absent. Any loss of substance that may have been evident in the first stage of flaccidity quickly disappears as the flexor spasms become vigorous. Even after a short attack of pyelitis, lasting for ten days or a fortnight, during which the muscles have suffered a little, the legs soon recover their original size provided the reflex arcs are in high functional activity.

The importance of early catheterization after the development of the

cord injury, and of emptying the bladder at regular and frequent intervals, cannot be overestimated. Overdistention of this organ not only prolongs the stage of retention by diminishing the excitability of the detrusor muscle to adequate stimuli, but endangers, at the outset, the life of the patient; for then cystitis, often hemorrhagic, develops early to terminate the life of the sufferer in a few weeks or at most months. The irrigating fluid ought to be passed into the bladder only under very gentle pressure, a small quantity at a time. A large amount of fluid is just as liable to prevent the recovery of the bladder muscle by overdistending the bladder and to hasten septic infection of its mucous lining as delay in catheterization.

As to partial or complete transverse lesion of the cord, Riddoch states that by studying the activities of the flexor and extensor reflex arcs of the lower extremities, it is frequently possible to say whether conduction in the spinal cord has been completely destroyed or not. We know that total transverse division of the cord gives rise to the symptom-complex of "paralysis in flexion," while many partial lesions are associated with "paralysis in extension."

Automatic Action of the Bladder in Spinal Injury. The action of the bladder in injury of the spinal cord has been studied by Head and Riddoch.⁴¹ They find:

When the spinal cord has been completely divided, the bladder may begin to expel its contents automatically as early as twenty-five days after the injury, under favorable conditions.

In unfavorable cases, when the patient suffers from chronic septicemia, due to a bed-sore, grave cystitis or pyelitis, automatic micturition may never become established, however long the patient survives the injury.

If a catheter is passed after automatic, but involuntary, micturition has become established, and fluid is allowed to run into the bladder under the least possible pressure, it will be expelled after a certain volume has entered. This volume varies between about 100 c.c. and 600 c.c.

This expulsion of fluid through a catheter from contraction of the muscles of the bladder wall can be evoked at a time when the patient is unable to micturate automatically during the period of complete retention. This retention is due to spasmodic contraction of the sphincter mechanisms, which does not relax although the muscular wall of the bladder is capable of vigorous contraction.

The form assumed in the automatic bladder is independent of the site of the lesion of the spinal cord.

If the spinal cord is seriously injured or even completely divided anywhere above the lumbar region, automatic evacuation and complete micturition may be facilitated by various afferent impulses passing into the lower portion of the spinal cord.

When the sole of the foot, the thigh or the abdomen is scratched, a flexor spasm may be evoked. If this is so, the bladder may empty itself when its contents scarcely reach one-half of the amount otherwise necessary to produce a contraction of the muscular wall.

⁴¹ Brain, 1917, xl, 188.

After destruction of the lower lumbar and sacral roots, the bladder may act automatically in an identical manner, except that it can no longer be influenced reflexly by any afferent impulses.

When the lesion is confined to the lower end of the spinal cord or to the lower lumbar and sacral nerve roots, the patient may be conscious of tension within his bladder, may recognize the contractions in its muscular wall, and may experience that pleasure which normally accompanies evacuation.

When the bladder is acting automatically, deep breathing may cause the muscular wall to expel its contents before they have reached sufficient volume to be otherwise an adequate stimulus.

Pressure on the abdominal wall not only tends to expel the contents of the bladder mechanically, but also acts as a stimulus to otherwise premature evacuation.

The Syndrome of Accommodation: Convergence Paralysis. An interesting paper has been written by La Salle Archambault⁴² on an ocular symptom-complex to which little attention has been devoted. He states that within the past two years he has had occasion to examine a number of patients who complained of headache, supraorbital distress upon using the eyes for near work, vertigo, general exhaustion, mental depression and other apparently neurasthenic symptoms and in whom careful examination revealed definite objective evidence of disordered innervation of the ocular musculature. In all of these cases a symptom-complex consisting of bilateral weakness or paralysis of accommodation and convergence with consequent failure of the associated pupillary contraction, but with retention of the pupillary light reflex, was demonstrable. The retention of the light reflex of the pupil is important. He believes that this syndrome is dependent upon pathological changes involving the ciliary ganglion or some of its related fiber bundles. This conclusion is based purely on clinical observation, as there has been no opportunity for anatomopathological control, but the assumption he believes is justified in the light of our actual knowledge of the ciliary ganglion and its connections derived from abundant anatomical studies and from physiological and pharmacological experiments.

It is to be admitted, he asserts, that through its afferent and efferent branches the ciliary ganglion represents the peripheral organ presiding over the mechanism of accommodation and indirectly over that of convergence, inasmuch as accommodation and convergence are physiologically interdependent. While the one may rarely be executed independently of the other (temporarily under atropine instillation and in certain lesions of the brain-stem), it is undeniable that convergence simply subserves accommodation and it is difficult to conceive that it may serve another purpose. Any lesion compromising the ciliary ganglion or its afferent branches would be expected to cause abolition or impairment of accommodation and with this an associated and proportionate reduction of convergence with disturbances of pupillary reaction. He believes that under such circumstances the pupillary light reflex, though enfeebled,

⁴² Journal of Nervous and Mental Disease, September, 1917, p. 161.

will persist unless the lesion is a destructive one. The syndrome is the converse of the Argyll-Robertson pupil phenomenon. The fibers serving the light reflex are more resistant and the pupillary light reflex persists as long as any fibers remain to ensure the impulse transmission.

The convergence paralysis symptom-complex often appears suddenly, accompanied by vertigo and by more or less false projection. It has been observed in connection with tabes, paresis, syphilitic basal meningitis, multiple sclerosis, myelitis, tumor of the corpora quadrigemina and other organic lesions of the central nervous system and in functional conditions. Archambault makes the interesting statement that many authors refer to paralysis of accommodation in diphtheria without specifying the concomitant convergence paralysis and pupillary inactivity, and yet in the past year he has seen 4 cases of postdiphtheritic accommodation paralysis in all of which both of these phenomena were associated.

The impairment of accommodation need not be considerable in order to inhibit convergence, but a greater or lesser degree of convergence insufficiency sometimes occurs, although accommodation is apparently preserved and the pupils react to accommodation efforts. The inverse phenomenon, *i. e.*, loss of the pupillary reaction to accommodation efforts with retained convergence has been reported by others but never observed by Archambault.

He has been partly guided to his conclusions by finding in several cases of definite unilateral retrobulbar disease with more or less exophthalmos, ciliary neuralgia and changes in the fundus, that the only symptom referable to the third nerve was weakness of accommodation and convergence and the loss of the related pupillary reaction. Otherwise there existed no evidence of implication of the third, fourth and sixth nerves. It is not meant to infer that in these cases the lesion was limited to the ciliary ganglion, but that this ganglion was involved in the exudative or infiltrating process affecting the retrobulbar structures.

Being embedded in fatty areolar tissue and located in the immediate proximity of the optic nerve and ophthalmic artery, it would almost necessarily be involved in any infectious process gaining access to the deeper part of the orbit.

It is important to know that the accommodation-convergence paralysis syndrome in the great majority of cases is purely transitory, generally clearing up in the course of a few weeks or months.

Archambault devotes considerable space to the mechanism of the Argyll-Robertson phenomenon, and those interested in this subject I must refer to his carefully considered explanation, but it may be stated that his conclusions are that the pupillary light reflex and the accommodation-convergence pupillary reaction are not determined by centrifugal impulses travelling along the same fiber path and that each phenomenon is dependent upon the association of given cell complexes and fiber fasciculi. It is believed that not only in the ciliary ganglion but also in its afferent roots and efferent branches a true differentiation of cell groups and nerve fibers exists and that in this way independent and specific anatomophysiological combinations are assured.

In all the cases of accommodation-convergence paralysis reported by Archambault the symptoms had an acute onset and followed either evidence of general infection or toxemia or else actual infectious processes about the orbits and nasal fossæ. The symptoms in all cases were strictly local, and repeated examination failed to disclose any sign of involvement of the cerebrospinal axis. There can hardly be any doubt, he thinks, that the symptoms were dependent upon pathological changes within the orbit. In some of the cases antisiphilitic treatment yielded no results and Archambault suggests the cause may have been the infection of poliomyelitis. Foci of disease in the region of the aqueduct of Sylvius and corpora quadrigemina undoubtedly do produce, usually with other symptoms, the accommodation-convergence paralysis but there is little ground for the assumption that this syndrome, occurring as an isolated and transitory manifestation, is due to an elective central localization, rather it would seem to be dependent upon lesions of the ciliary ganglia and their connections.

The space I have devoted to a discussion of this subject is justifiable by the fact that Archambault's paper is one of the most thoughtful presentations in recent neurological literature.

Unilateral Ophthalmoplegia. This is by no means a common condition, indeed Viets⁴³ has been unable to find a case reported in which an aneurysm or tumor was found as the cause at operation or necropsy. Tumor of the orbit may, of course, produce unilateral ophthalmoplegia. He reports a case in which the symptoms began with headache only on the right side of the head in the frontal and occipital regions. A few days after the onset the right eye closed, and numbness and pain were noted around the right eye, the right side of the nose, and part of the right cheek. All the external ocular muscles of the right eye were paralyzed, and there was no reaction in the right pupil to light, in accommodation or consensually. The left eye was not affected.

The diagnosis of a lesion at or near the sphenoidal fissure was made and it was believed to be a tumor, and at operation a smooth, pulsating tumor the size of a walnut was found, more or less filling the fossa, and was regarded as an aneurysm of the internal carotid artery. No attempt was made to remove it.

Paralysis of the Last Three Cranial Nerves. The symptoms caused by lesions of the cranial nerves are well understood, except for the ninth, tenth and eleventh; concerning the function of these nerves there is more or less dispute. These nerves form one continuous group. The paralysis of the external branch of the eleventh nerve causes paralysis of the sterno-cleido-mastoid and trapezius, recognized by projection of the clavicle on the paralyzed side producing the appearance of hypertrophy, in reality a pseudohypertrophy, of the clavicle and the formation of a deep cavity in the supraclavicular region, especially seen in the elevation of the shoulder and abduction of the arm. The sterno-cleido-mastoid and trapezius muscles are less prominent, the shoulder droops

⁴³ Journal of Nervous and Mental Disease, April, 1918.

and projects a little in advance, the abduction of the arm is impaired, and pain is felt in the clavicular region.

The inner branch of the eleventh nerve is really a part of the pneumogastric and is believed to innervate the soft palate and the larynx. The facial probably does not innervate the soft palate, but there is some doubt as to whether the soft palate receives its nerve supply from the pneumogastric. The distinction is not an important one, as the upper fibers of the eleventh nerve really are pneumogastric fibers.

French writers have assigned names to syndromes consisting of paralysis in different forms of the ninth, tenth and eleventh nerves, and the subject is discussed by Castro and Gama.⁴⁴ Paralysis of the soft palate and larynx on the same side is called the syndrome of Avellis, and indicates a lesion of the inner branch of the eleventh nerve, but an addition of paralysis of the sterno-cleido-mastoid and trapezius muscles on the same side to the above paralysis produces the syndrome of Schmidt. A still further addition of paralysis on the same side of the tongue, with atrophy, forms the syndrome of Hughlings Jackson. One wonders why other syndromes should not be called by the names of persons according as this or that cranial nerve palsy is added, and sometimes the above group of symptoms is associated with paralysis of the facial nerve. Indeed the syndrome of Collet has been applied to the paralysis produced by lesions of the last four cranial nerves. The application of proper names in this way is unnecessary and confusing, but it is important to know what is meant when these various syndromes are mentioned.

Surgical Treatment of Trigeminal Neuralgia. When one can report an experience in the surgical treatment of trigeminal neuralgia founded on 302 cases, as Frazier⁴⁵ has done, his statements are worthy of attention. He has had 39 peripheral operations, 99 alcoholic injections, 130 intracranial operations, and 34 cases that were not treated. He makes the statement that can hardly be contradicted, *viz.*, that with few exceptions trigeminal neuralgia is not a self-limiting disease. The surgeon now has only to consider alcoholic injection or the avulsion of the sensory root. The former is of only transitory effect. Properly given, it will arrest the pain immediately and absolutely, and for an average period of nine months. The patient who has not had his neuralgia long usually chooses the injection. In the long-standing cases the radical operation alone is acceptable, unless the patient is old and has a short expectation of life, when the alcoholic injection may be used to make the remaining years comfortable. The injection, if given by one who has had little experience, may produce a stiff jaw, facial paralysis, oculomotor palsy, or trophic keratitis. The percentage of failures with injection by the inexperienced is high. Frazier uses nitrous oxide or very light chloroform anesthesia when he gives an injection, and thus avoids the pain.

Shall injection of the Gasserian ganglion be practised? The incidence of corneal complications with the treatment, apart from injuries to the

⁴⁴ Revue neurologique, April and May, 1917, p. 149.

⁴⁵ Journal of the American Medical Association, May 11, 1918, p. 1345.

abducent and oculomotor nerves, is not small, and these results make this treatment very objectionable to Frazier.

One of the most striking statement made by him is that in a great many instances he has been fortunate in not being compelled to sacrifice the motor root, and in later years he has an increasing percentage of cases in which the motor root has been saved. Since 1901 he has had four deaths in 160 operations. Two of these were caused by apoplexy, and all of them were among subjects of the 121 intracranial operations. There was one death in 1904 and one in 1910, and there were two in 1912. In a series of 87 consecutive operations, there have been no deaths since 1912.

Dissociated Paralysis of Musculospiral Nerve. It is seldom that only a part of the musculospiral distribution to the hand is paralyzed and when this occurs in the ring and little fingers, as shown by Marie, Meige and Patrikios,⁴⁶ the condition may simulate on superficial examination an ulnar palsy. In a case reported by these authors, all the muscles innervated by the ulnar nerve contracted voluntarily, were not atrophied, and the electrical reactions and sensations were normal. The last two fingers could not be extended voluntarily nor by the electrical current, whereas voluntary and electrical contractions were possible in the other extensors of the fingers and thumb. The wound was at the union of the upper and middle thirds of the forearm, and implicated only the nerve fibers of the musculospiral supplying the affected fingers. The flexion of the ring and little fingers affected all the phalanges of these fingers, whereas in ulnar palsy the proximal phalanges are in extension.

Since the publication of the case described above, two similar cases have been described by Roussy and Branche.⁴⁷

Left Recurrent Laryngeal Nerve Palsy. This form of paralysis may occur from many causes, among these are aneurysm and dilatation of the arch of the aorta, but it does not seem to be so well known that it may be caused by mitral stenosis. Ortner was the first to speak of this and wrote a paper on the subject in 1897. Other causes are mediastinal enlargements, and pericardial and mediastinal adhesions compressing the nerve. Only 11 cases, with necropsy, of this palsy from mitral stenosis are said by Brown and Hempstead to have been reported until 1916, but clinical cases have been more numerous. The explanation given by Fetterolf and Norris is that the indirect mechanism may be a variable one, but when compression is accountable for the recurrent paralysis, it is always caused by the nerve being squeezed between the left pulmonary artery and the aortic ligament. Anything that will dilate or force upward the left auricle or the left pulmonary artery would tend to cause the condition.

Brown and Hempstead⁴⁸ report a case of mitral stenosis, associated with temporary paralysis of the left recurrent nerve during a period of mild decompensation, in which, under appropriate treatment, the left

⁴⁶ Revue neurologique, February and March, 1917, p. 123.

⁴⁷ Ibid., October, November and December, 1917, p. 312.

⁴⁸ Journal of the American Medical Association, January 5, 1918, p. 4.

auricle decreased in size. The reduction in size of the auricular chamber evidently released a pressure on the left recurrent nerve with restoration of its function. These authors state that their case is the only one they could find, in which a diagnosis could be made early enough to allow the nerve function to return. It illustrates the importance of a rigid investigation of every case of left laryngeal paralysis to rule out its more common causes, as no other condition offers a better chance of relief than does this particular type.

Brachial Neuritis and Sciatica. Patrick⁴⁹ gives important and useful means of diagnoses regarding these rather common disorders, and points out the mistakes in diagnoses often made. Only about one in ten of the patients referred to him for brachial neuritis really had it, approximately four-fifths had arthritis of the shoulder-joint. One tenth had bursitis, syphilis, neoplasm, cervical rib, postherpetic pain, osteomyelitis, cervical caries or cervical arthritis. Mistaken diagnosis of brachial neuritis has been made chiefly because of the prominence of pain, because the pain was not distinctly localized in the shoulder-joint, and probably because the examination had not been thorough.

Patrick finds that neuritis is rare, the pain is constant, is not influenced, or at most very little, by passive movement of the shoulder, and usually is not affected greatly by active movement, though the patient moves the arm carefully. The suffering is intense, such as never occurs in arthritis except in the worst cases, when the patient cannot move the joint at all. Intermittent, grumbling pain is rarely caused by neuritis. There is distinct, generally exquisite, tenderness of the cords of the brachial plexus or of the nerve trunks or of both in neuritis. In some cases there is distinct, though slight, tactile anesthesia and sometimes surface hyperesthesia or hyperalgesia. Tingling or subjective numbness of fingers or forearm is frequent. The deep reflexes of the arm are lost.

Arthritis of the shoulder is common, and the pain fluctuates more or less, even when very bad. In less severe cases it is intermittent, not only within twenty-four hours, but the patient has his good and his bad days. The pain is often influenced by the weather and is worse at night. It may be felt chiefly about the insertion of the deltoid. Sometimes it is diffuse, radiating into the neck and down the arm, probably from concomitant arthritis of the cervical spine, the nerve roots being irritated where they pass out through the intervertebral foramina or the nerve trunks being irritated where they pass close to the shoulder-joint.

In arthritis cases, no matter where the pain may be felt, certain movements of the shoulder-joint, active or passive, cause pain. They are not always the same, but the most frequent painful movement is adduction of the humerus with retraction and internal rotation, the movement involved in crossing the forearms behind the back. A woman may therefore have difficulty in fastening her skirts and her waist behind, and a man in putting his hand into his hip pocket. Another test movement recommended by Patrick is to extend the arm straight upward and

⁴⁹ Journal of the American Medical Association, December 29, 1917, p. 2176.

then rotate it as if operating a screw-driver. In many cases of arthritis, movements may be painless, this is true more of the chronic form.

The deep reflexes are uniformly brisk, even considerably exaggerated, in arthritis, even when the muscles are atrophied, and the arthritic muscular atrophy does not indicate neuritis.

Two other valuable signs of arthritis are fever and leukocytosis. They may not be found in very mild and chronic cases. The rise in temperature may be slight, only a degree; the increase in the leukocyte count may be slight. These signs suggest an infectious origin, and often less obtrusive arthritis can be found elsewhere in the body, as in the other shoulder or the cervical spine. There may be also a coexistent indurative headache or soreness and tenderness of the occipital or suboccipital region, probably from infection, the focus being somewhere in the head or the throat.

Patrick regards sciatica as a relatively rare disease, but he does not side with those who assert that all sciatica is hip-joint disease. Sciatica causes no limitation of passive motion except as shown by Lasègue's sign, whereas arthritis of the hip interferes with some movement or other. He gives an interesting test which he has named the *fabere* sign, the letters standing for flexion, abduction, external rotation and extension. With the patient supine on a level surface, the thigh is flexed and then the external malleolus or ankle is placed above the patella of the opposite extended leg. In bad cases even this maneuver cannot be executed without pain, but many patients do it easily. If the knee is now depressed, the ankle maintaining its position above the opposite knee, the patient will complain of pain before the knee reaches the level easily attained in normal persons. This procedure involves flexion, abduction, external rotation and then extension of the thigh. In making this test, one must not be deceived by the patient's yielding to depression of the knee by tipping the pelvis.

Hip arthritis frequently is complicated by involvement of the lumbar spine, and probably of the fibrous structures overlying the sacrum. This may cause pain radiating down the limb.

The Sympathetic Supply of the Upper Limb. An interesting case studied by Tinel⁵⁰ throws light on the sympathetic innervation of the upper limb and supports the views of Claude Bernard, who located these fibers in the first four thoracic roots, Tinel's case was one of irritation of the third and fourth thoracic roots by a bullet. The left upper limb showed no paralysis, no atrophy and no sensory change, but the man experienced a sense of fulness, tingling and coldness of the hand and fingers, and the hand was blanched, the pulse imperceptible, and the veins of the back of this hand almost invisible. All these changes probably were caused by disturbance of the two thoracic roots mentioned.

Injury of Ulnar Nerve. It is sometimes very difficult to determine whether a nerve is partially or completely divided and a peculiar cause of error has been pointed out by Halipré.⁵¹ He reports a case in which the ulnar nerve was divided above the elbow; the nerve was excitable

⁵⁰ Revue neurologique, June, 1917, p. 499.

⁵¹ Ibid., 1917, Nos. 10, 11 and 12, p. 236.

to the electrical currents almost in normal degree below the elbow but not above. The diagnosis of incomplete division was made, but the nerve was seen to be completely divided at the operation. An anastomosis was found between the ulnar and median nerves. This occurrence is recognized by anatomists, but it is liable to be forgotten, and mistakes in diagnosis may easily be made. According to some anatomists it is found in 4 out of 5 cases; according to others, in 1 out of 4 cases.

Rhizotomy for Relief of Pain. Nine cases of rhizotomy for the relief of pain are reported by Frazier,⁵² in all of which the operation was done by him. One was a case of persistent pain after herpes zoster. The immediate results were most gratifying, inasmuch as he converted a definite region of the body from one of extreme pain and hyperesthesia to a painless anesthetic zone, and the patient, who had been dependent upon his daily ration of morphine and sedatives, was able to sleep the night through without a narcotic. A few weeks after the operation pain began in the adjacent territory. Before the operation the pain was in a zone represented by the sixth to the ninth thoracic roots, now it was in the zone of the tenth and eleventh roots. One must conclude that the lesion had spread to the adjoining roots.

Another case was one of tearing from the cord of a number of cervical roots by a severe blow on the shoulder. As a result of the operation the man was able to do without opium, and the pain, though still present, was more bearable.

Three of the operations were done for the excruciating pains accompanying inoperable lesions of the spine and spinal cord and malignant infiltration of the cords of the brachial plexus, secondary to carcinoma of the mammary gland. As to the results in these cases, Frazier regards them as more than justifying the operation, not underestimating all its discomforts, although in future in lesions below the sixth thoracic segment he would substitute a chordotomy (division of the anterolateral column of the cord) for rhizotomy.

Although rhizotomy has been recommended for sciatica, Frazier has never seen a case of this condition in which he felt justified in recommending so formidable a procedure, which in the lumbosacral region is attended with technical difficulties not common to operations upon the roots in the cervical and thoracic regions.

He has performed the operation in 3 cases for the relief of pain of gastric crises, but all cases of gastric crises will not be benefited by this operation. The stomach is supplied partly by motor and secretory fibers from the pneumogastric nerve and partly by the sympathetic system through the splanchnic afferents entering the cord *via* the posterior thoracic roots. In the gastric crises consisting of nausea and vomiting without pain and hyperesthesia the condition is believed to be of pneumogastric origin, and in such cases rhizotomy can be of no avail.

Neurotization of Paralyzed Muscle by Muscle Grafting. Many attempts have been made to improve the condition of a limb paralyzed by polio-

⁵² Journal of Nervous and Mental Disease, May, 1918.

myelitis, and among the most important is neurotization. This Nutt⁵³ has attempted by splitting the sheaths of both the normal and paralyzed muscles, scarifying the fibers so as to remove all obstruction offered by the sarcolemma to the growth and extension of nerves, and then suturing the open surfaces of the two muscles together. He quotes interesting literature bearing on this question. The neurotization of a paralyzed muscle by nerve implantation has been attempted by a number of investigators. Heincke has had some success, and Erlacher has claimed that hyperneurotization is possible. Steindler believes that the method has been successful in his hands but does not believe it is possible to hyperneurotize a muscle. Elsberg has determined that if an artificially paralyzed muscle is implanted with its original nerve and also another motor nerve, reestablishment of function takes place through the original nerve and not through the foreign nerve, but if the original nerve were not implanted, the foreign nerve would take the function.

Nutt urges that by the method employed by him nothing can be lost even if nothing should be gained. No function is sacrificed as is the case in such operations as muscle transplantation, tendon fixation, and nerve implantation. The objection to early operation, which is valid in other procedures, does not hold good for this operation. It is interesting therefore to note what results Nutt has obtained.

Sixteen cases are reported. In 4 of them, 2 paralyzed muscles each were operated on, making a total of twenty muscle graftings. Seven were complete failures. Six patients showed a slight return of power which was not sufficient to be of functional use. Slight power, however, may add to the strength of the joint and be of benefit. Four cases gave fair results and 3 good results.

To determine the possibility of neurotization of paralyzed muscles by implantation of motor nerves, Gerster and Cunningham⁵⁴ carried out a series of experiments on animals. The gluteal hamstring group of muscles was deprived of its motor nerve supply. The anterior tibial nerve was divided close to the knee and then implanted into the paralyzed muscle belly. Only 3 out of 13 rabbits gave positive findings on account of an epidemic among the operated animals. These authors succeeded in obtaining by stimulation of the implanted nerve trunk normally strong contractions in the previously paralyzed muscle, and the response was as strong as that obtained from stimulation of normally connected motor nerve trunks in the vicinity. An examination with the gold chloride precipitation method by Globus showed branchings of the implanted nerve as well as motor nerve endings. These investigators conclude that from their own observations and those of others it seems fairly well proven that a recently paralyzed muscle can be innervated by implantation of a motor nerve. This may be the identical nerve which originally supplied the paralyzed muscles or some other motor nerve.

Nerve Grafting. Tinel⁵⁵ has made nerve grafts in 6 cases, and 1 case had a duration of twenty-three months. The man had a break in the

⁵³ Journal of the American Medical Association, December 22, 1917, p. 2082.

⁵⁴ Medical Record, August 11, 1917, p. 223.

⁵⁵ Revue neurologique, June, 1917, p. 497.

ulnar and median nerves 8 cm. in length, and the piece of nerve used for grafting was taken from the musculocutaneous of the leg. Sensation had returned to a considerable degree in the ulnar distribution and the muscles had largely recovered from their atrophy and showed faradic irritability. There was also much return of voluntary motor power. The median nerve had not recovered. Tinel observed improvement in 3 other cases of nerve grafting. In 2 cases recovery was unsatisfactory although the graft showed function; the young nerve fibers had entered the graft through the first suture but had been unable to pass the second suture. This is because, by the time the nerve fibers had reached the second suture, scar tissue had formed here and could not be easily penetrated. It is desirable to use a nerve for the graft of the same size as the injured nerve, but this is impossible when the graft is taken from the patient. Experimental work has shown that in the dog a graft may be used that has been kept ten to fifteen days.

Rabies. As stated by Levy,⁵⁶ there are records of only 150 cases in which paralysis has followed Pasteur's antirabic treatment, and 25 of these were with fatal termination. Levy reports a case of isolated facial diplegia as an unusual form of "treatment paralysis," and in this case there was a remarkably long latent period between the beginning of the treatment and the development of the paralysis. He mentions that in a majority of cases the paralysis has developed while the patients were receiving the injections; in about one-quarter, according to Simon, within seven days. Fielder is said to have reported an instance of facial paralysis with onset thirty-one days after beginning treatment. In the case reported by Levy, seventy-three days elapsed between the beginning of treatment and the onset of the paralysis. Symptoms began after the fourth injection and were similar to those described in other instances of "treatment paralysis." Records of 10 other cases of isolated facial paralysis following antirabic treatment are found in the literature. In the last 3 of these cases the biting animal was proved non-rabid. In all cases in which complete data are available, the persons were males. The earliest appearance of the facial paralysis was on the seventh day; the latest, exclusive of Levy's case, was on the thirty-first day after treatment was begun. In 6 cases the facial paralysis was unilateral; in 5, bilateral. In the bilateral cases an interval of from one to eleven days elapsed between the development of paralysis on the two sides. In no case were both sides of the face paralyzed at the onset. Dulling of taste over the anterior portion of the tongue accompanied the facial paralysis in 3 cases. Nine of the 11 cases were with recovery. In 2 cases there were traces of paralysis nine months later. The etiology of these paralyses is still in doubt.

Reflex Paralysis. An interesting study of this form of paralysis has been made by Mirallié.⁵⁷ It was confused with hysteria at the commencement of the war, as a purely functional disorder, but the manner of development, and especially the resistance to treatment, have led

⁵⁶ Journal of the American Medical Association, December 1, 1917, p. 1873.

⁵⁷ Revue générale de pathologie de guerre, 1916, No. 1, p. 19.

neurologists to place it in a group apart. The injury often is very slight, and, in the majority of cases, the nerve trunks are not affected, only the nerve terminations are affected, or the lesion may affect only the skin or slightly the adjacent muscles. A reflex paralysis may be associated with an organic paralysis, in the former the hand, when affected, is cold and bluish, with exaggeration of the muscular reflexes. Usually the muscles which have been the seat of the lesion are those in which the paralysis appears, but the lesion may be higher than the paralysis, as when the paralysis appears in the hand following a lesion of the arm, or in the foot following a lesion of the thigh. The paralysis usually appears quickly after the trauma, even immediately, but occasionally it is of slow development, and may be with contracture. The hand may be affected alone, but more frequently the forearm and arm are also implicated. In the lower limb the deformity almost invariably is that of the varus type. These contractures are permanent when the patient is asleep as well as when he is awake. The paralysis does not correspond to any nerve or root distribution. A whole segment of a limb is paralyzed in all its movements.

Mirallié says he has seen cases in which the whole hand was paralyzed except the thumb. The peculiar positions are not always caused by contracture, and there may be hypotonicity in some muscles with hypertonicity of their antagonists. One type of deformity does not always change into another. The affected part shows a lower temperature and free perspiration. Spontaneous pain is not common, but passive movement often causes pain. The muscles may be tender to pressure. Sensation may be normal, more frequently tactile and pain sensations are abolished, or all forms of sensation may be abolished, but not in any distribution corresponding to nerves or nerve roots, but never is there sharp transition from the anesthetic to the sensitive part. Muscular atrophy may affect the entire part but never is limited to a few muscles. The increased muscular irritability is well seen in the hand, percussion causes a slow and extensive movement of the muscle, much more intense than that seen in the unaffected limb. There is often increased faradic and galvanic irritability without reaction of degeneration, but the electrical reactions may be normal. Decalcification of the bones in the affected part may be seen by the x-rays.

Mental symptoms are not recognized by Babinski and Froment as essentially a part of the reflex paralysis, as they are by some investigators. The condition is one of mental torpor, inertia, and concern about the paralysis. The patient keeps his eyes on the affected hand and protects it with the other hand. The immobility is like an *idée fixe*, a sort of motor negativism. This anxiety with mental inertia and absence of organic disease, and even of positive injury, has given rise to the suspicion that the condition is one of exaggeration.

It is very obstinate, especially if not treated soon after its development. Psychotherapy plays an important role, and encouragement and promise of reward in leave of absence from military duty if voluntary effort toward recovery is made by the patient have proven to be of service. In this way also the role of the mental state over the persistence

of the paralysis is shown. Officers seem to recover more rapidly than the soldiers, but the recoveries are exceptional.

All writers agree that this disorder should not be classed with hysteria. These palsies are not cured by persuasion and cannot be produced by suggestion, but neither are all hysterical conditions. The effect of persuasion is not always immediate.

The nature of this peculiar paralysis has not been determined. Some thought has been entertained that the nerve cells of the anterior horns may be affected, or that the sympathetic system is implicated, and that vascular symptoms are the most important. In some cases the symptoms suggest a neuritis, and in others the immobilization of the limb for the treatment of the wound seems to favor the development of the symptoms, but such explanation will not answer when the paralysis follows immediately the receipt of the injury.

Severe methods of treatment, such as mechanotherapy and strong electrical currents seem to do harm.

Camus writes on reflex paralysis and he believes there are different causes for this symptom-complex. It may be a local inflammation or the presence of a small foreign body, and in such cases the removal of the cause brings improvement. In other cases immobilization, unconscious or voluntary, plays an important role, and when the patient is encouraged to use his limb the condition improves. The initial lesion may be slight or grave, superficial or deep, with or without suppuration, or the patient may not have had any wound and have been the victim of shell shock. The pathology is uncertain, it is a possibility but not a certainty, that the slight changes may occur in the muscles or nerve fibers, or the nerve cells may be altered by repeated peripheral irritation or by the long inactivity of the limb, but all this is purely hypothetical.

Hemiplegic Form of Spinal Commotion with Paralysis of the Spinal Accessory Nerve. It is very seldom, according to Roussy and Lhermitte,⁵⁸ that commotion of the brain caused by the bursting of a shell in the neighborhood causes focal lesions of the brain; more frequently the symptoms are those of a psychoneurosis. On the other hand, they assert that the bursting of a shell producing spinal symptoms is more likely to cause organic change in the spinal cord.

These writers describe a very interesting group of cases in which spinal hemiplegia occurred without the syndrome of Brown-Séquard but associated with paralysis of the external branch of the spinal accessory nerve. The sterno-cleido-mastoid and trapezius muscles show atrophy and paralysis on the side of the hemiplegia, with complete or incomplete atrophy of the affected muscles. Sometimes, in addition to the lesion of the spinal accessory nerve, the fibers of the cervical plexus may be implicated, with severe pain and diminished sensation in the side of the neck.

The hemiplegia does not develop immediately after the injury, usually not until some days later when the signs of shock are diminishing. At first, spinal commotion causes complete paraplegia if the shock affects

⁵⁸ Annales de médecine, 1917, No. 4, vol. iv, p. 458.

the thoracic or lumbar region; or quadriplegia if it affects the cervical region. Quadriplegia under such circumstances does not carry with it necessarily a grave prognosis. It usually diminishes rapidly in intensity, and after some days the symptom-complex is left which is likely to persist for some months. Disturbance of the bladder and bowels, usually present at first, is likely to disappear within a short time.

The hemiplegia usually diminishes in intensity, first in the lower limb. It differs from the Brown-Séquard type in that, objectively, superficial and deep sensations are not affected, or very slightly so.

In one case a peculiar subjective disturbance of sensation was found, consisting of pain in the entire paralyzed side, and provoked by the slightest contact. The explanation for this is not given. Also as a rare manifestation may be vasomotor disturbance on the paralyzed side consisting of changes in the sweating and local temperature, especially noticeable in the foot and hand, which are regions richly supplied with vessels. These parts may be cyanotic, and the temperature of the whole paralyzed side may be less, whereas the sweating may be increased.

The hemiplegia, quadriplegia or monoplegia has a good prognosis *quoad vitam* and often terminates in complete recovery, but early wasting of the hemiplegic side has been observed and the electrical reactions of the muscles and nerves are unchanged.

Shell Shock. It would be better to speak of war shock in preference to shell shock, but the latter term probably has come to stay. Ames⁵⁹ states that statistics of the returned casualties compiled in Ottawa show roughly that cases of nervousness in all forms constituted about 3 per cent. of all the casualties, perhaps one-half being cases of war shock.

Throughout the war it has been a matter of comment that prisoners of war do not have war shock. It has been stated that wounded men do not have war shock, all nervousness that they might have had ceasing instantly on being wounded. It has also been asserted that war shock never develops in a man who was asleep when a shell burst near him. Crack regiments had fewer men affected by war shock, as did old regiments with long traditions of pride. It is stated that among officers there is relatively a smaller percentage of affected men than among privates. One of the most striking features is the relatively small number of cases among woman nurses and civilians who were often exposed to shell fire.

The immediate exciting incident provoking the attack might be either a physical or an emotional shock. The physical shocks were frequently tremendous. Being gassed constituted another inciting cause, as did aéroplane raids and mine explosions, or anticipated mine explosions. The emotional causes were likely to produce less sudden onset of symptoms; the factors were most frequently fear or suspense. The large percentage of cases had their onset some time after the shock, some of the men coming out of unconsciousness and being for several days without any symptoms at all, then developing mutism, blindness, tremors, etc.

⁵⁹ Journal of Nervous and Mental Disease, January, 1918, p. 43.

Once the symptoms started, they were likely to assume their maximum severity within twenty-four hours, so that all of the different symptoms appeared at the end of that time. As a rule, from the time the man was taken care of, the symptoms began to abate, subsiding in the majority of cases, one by one at irregular intervals. Some of the symptoms that disappeared did so in a few moment's time; the use of the voice came back all at once, blindness disappeared almost instantaneously, as did paralysis, though the use of limbs that had been paralyzed might be slow. The cessation of tremors had never been rapid.

The course might be continuous or interrupted, exacerbations being common. The severity of the symptoms varied in many respects. Some cases were extremely severe and others very mild. Those cases which were monosymptomatic were likely to be more severe than those with more than one symptom. The intensity of any symptom was in inverse proportion to its duration.

The symptoms might be classified as psychical or physical; the first involved ideation or emotional features or both; the second was characterized chiefly by motor symptoms, symptoms involving the special senses.

MacCurdy,⁶⁰ in discussing this paper by Ames, regarded the prevalence of shell shock given at 3 per cent. as too low. Figures have shown that 12 per cent. of those invalided home to Canada suffered from neuroses and mental diseases, 58 per cent. of which had a diagnosis of shell shock. In one-seventh of those discharged from the British army the cause has been mental and nervous disorder, of which the largest proportion were war neuroses.

In regard to etiology the first point is fatigue. Such fatigue as occurred in the trenches was unknown in times of peace. The soldier must go four or five days, perhaps even for a week without sleep, with inadequate rations, with little or no shelter from the weather and always exposed to a frightful bombardment. This produced such extreme fatigue that it broke down inadequate resistance and resulted eventually in a neurosis.

The symptoms of shell shock have been divided into two groups: (1) Those which seem to depend solely on a neurotic condition (the traumatic psychoneuroses), and (2) those resulting from organic change in the nervous system. Pitres and Marchand,⁶¹ in writing on this subject, say the symptoms in the organic cases are usually caused by localized lesions, the symptomatology of which recalls focal lesions of the brain or cord. Such symptoms are those of hemiplegia, paraplegia, monoplegia, the Brown-Séquard complex, the thalamic syndrome, etc. In other cases the lesions are diffuse and cause symptoms simulating certain organic nervous disorders, with extensive lesions on the surface or in multiple foci. These diffuse symptom-complexes are relatively rare as compared with those depending on a focal lesion. Guillain and Dupouy were among the first to publish cases of shell shock resembling, in their clinical features, multiple sclerosis, paralysis agitans, meningeal or cerebellar disease. Pitres and Marchand speak of pesudotabes and pseudoparesis.

⁶⁰ Journal of Nervous and Mental Disease, January, 1918, p. 43.

⁶¹ Revue neurologique, November and December, 1916, Nos. 11 and 12, p. 298.

In one of the cases described by these authors a man had meningeal symptoms following the bursting of a shell, and three days later developed ptosis, internal strabismus and mental symptoms. The presence of blood in the cerebrospinal fluid indicated an organic condition. Semistupor lasted ten months and then stupor became complete with refusal of food and stereotype attitudes suggesting dementia *præcox*. He later improved, his mental and cerebral symptoms disappeared, but a functional weakness of the lower limbs persisted.

In another case the symptoms were those of paresis, both physical and mental, but the man had some consciousness of his condition. This consciousness of disease may be found in the early state of paresis. This man believed he would be able to resume his military command notwithstanding the gravity of his state, and his symptoms gradually did disappear.

Another patient with shell shock presented a cerebellar syndrome; disturbance of gait, of station, of synergia, of diadochokinesis; to this was added a hemianesthesia affecting sensation and the special senses.

In another case the symptoms suggested multiple sclerosis. They were intention tremor, disturbance of gait, muscular rigidity and feebleness. The speech was not scanning, but it was monotonous and tremulous. The patellar and Achilles reflexes were lost during the six months of observation. The grave disturbances of sensation present in this case are rare in multiple sclerosis. A very gradual improvement was noted.

Another patient presented a condition suggesting tabes during eight months of observation in the loss of patellar and Achilles reflexes, slight Romberg sign, Argyll-Robertson pupils, incoöordination, and impaired sensation. The man had presented no symptoms before the bursting of the shell, and the symptoms developed within a few days. There had never been true fulgurant pains, and the early weakness is unusual in tabes. Gradual improvement occurred also in this case.

Loss of consciousness usually occurs immediately after the bursting of the shell and may last several hours or several days. Amnesia dates from the bursting of the shell and the explosion is not recalled, it may be retro-anterograde amnesia. The symptoms gradually increase, later become stationary, and while they simulate those of organic disease they differ in important features.

Some authors have attributed certain of the symptoms to hemorrhage in the central nervous system, and such hemorrhages may occur in the lungs, intestines, eyes, etc. If hemorrhage occurs in the meninges, it acts as an irritation and causes lymphocytosis and increased pressure of the cerebrospinal fluid. In some cases no signs of hemorrhage may be found and it is possible that the nerve cells in these cases are affected, or decompression of air brought about by the explosion may produce air bubbles in the vessels which cause obstruction in the capillaries with resulting necrosis or hemorrhage, as in caisson disease. The necropsies have not been sufficiently numerous to permit definite knowledge of the pathology, but we must believe that some cases of shell shock without external lesion are organic and not functional, although purely functional cases undoubtedly occur.

Synesthesia. Under the name of causalgia, Weir Mitchell described a burning pain resulting from injury of a nerve. Another phenomenon has been described by Marie and Madam Athanassio-Bénisty. In their patients the contact of the sound hand with a dry and warm object was sufficient to cause pain in the hand where nerves had been injured, and which did not occur if the sound hand was moist. Souques gave to this phenomenon the name of synesthesia. His attention was called to this curious condition by a man who, having a wound of the left median nerve, wore a rubber glove on the right hand to keep it moist. Cayla finds with his own cases there are 10 cases of synesthesia known in the literature, of which 4 were with wounds of the sciatic and 6 with wounds of the median. He believes Weir Mitchell overlooked this condition but he is uncertain, and quotes from Mitchell's writings in such a way that there is little doubt that Weir Mitchell recognized it. Mitchell said of one case that the skin was hyperesthetic everywhere and a touch of any part was disagreeable and was felt in the affected hand; and of another that the man, who had an injury of the left median nerve, before he touched anything moistened his right hand asserting that when it was dry the impression was reflected to the other side.

Cayla⁶² has studied this synesthesia carefully and finds that it occurs only when there is causalgia. It is observed especially in lesions of a mixed nerve and only when the nerve is injured but not completely divided. It appears some days later than the causalgia, and the pain is like that of a burn, and is in a limited area of the limb. The burning pain of causalgia is usually aroused by strong emotion, noise, odors or light. It is influenced by temperature, increased by warmth, diminished by cold and increased by dryness of the painful region.

In synesthesia touch of any part of the body produces this pain in a part of the distribution of the injured nerve, while the touch sensation is felt in the part actually touched, and there is not hyperesthesia. It seems to be necessary to have displacement of the cutaneous surface at the point of the contact, as in rubbing, in order to produce synesthesia, and it does not occur if the part touched or the area of the causalgia is moist.

Familial Head Nystagmus in Four Generations Associated with Ocular Nystagmus. Combined nystagmus of the head and eyes, persisting during life and reappearing in consecutive generations, must, as Yawger⁶³ says, be exceedingly rare. He reports a family in which this unusual manifestation occurred.

The family is of Russian Jewish nationality, and at least four generations have shown the disorder, members of three generations have been examined by Yawger. The important features of these cases are the persistence of the associated nystagmus in the stock and throughout the lives of the individual members, together with certain other nervous symptoms, notably stammering. Both sexes had the combined nystagmus and both transmitted it to their children.

⁶² Revue neurologique, October, November and December, 1917, p. 144.

⁶³ Journal of American Medical Association, September 8, 1917, p. 773.

From the fact that two brothers of the first generation exhibited the condition, it is possible that other instances of nystagmus occurred in earlier members of the family.

There were eight children in the second generation, three sons and five daughters. One daughter who had nystagmus lived to be 80 years old. Another daughter did not have the disorder, although she transmitted it to her sons, and these children were by different husbands.

There are three children in the third generation. A daughter is normal and has no family. The elder son, aged forty-eight years, is distinctly neuropathic; as a child he stammered badly. He has had nystagmus from infancy, but during adult life the manifestations have been less apparent. He is not conscious of the head shaking, although the phenomenon often recurs several times a day. Suddenly, and usually during the movements of abstraction, the head undergoes a series of horizontal, coördinated movements, consisting of five or six oscillations, of considerable amplitude and with an approximate frequency of twenty per minute.

The younger brother, aged forty years, has exhibited nystagmus of the eyes since birth and of the head for the past five years. He has two sons and one daughter, the latter alone shows nystagmus of the head and eyes. The movement of the eyes dates from birth and those of the head began a few months later.

In both instances in which the fathers in this family transmitted the disorder, they were themselves affected, while the mother who handed down the disorder did not have nystagmus, but transmitted the affection to her two sons, who were children by different husbands. There thus appears to be the same tendency regarding transmission as seen in progressive muscular dystrophy.

Yawger does not attempt to explain the phenomena.

Hysterical Abdominal Distention. This condition may resemble the posture of pregnancy and pathological conditions of the abdomen. It has been described as hysterical tympanitis, pseudocyesis, phantom tumor, etc. Lillie⁶⁴ states that Ebstein's explanation has usually been accepted, *viz.*, that it is caused by swallowing of air, which an imperfect closing of the pylorus allows to pass into the intestine, thereby distending them. Briquet believes that certain cases are caused by an abnormally low position of the diaphragm. Lillie finds that many instances of this condition occur in those who consciously or unconsciously are influenced by the suggestion of the pregnant state, the result of this being the production of attitudes and symptoms which are sometimes confusing in their superficial resemblances to actual pregnancy, and he reports a case illustrating this. In examining his patient when she was lying on a table, when the abdomen was distended, a well-marked lordosis was always noticed in the lumbar region. The back was elevated about two inches above the surface of the table and the same lordosis was present when she stood erect, but was never present at times when the abdomen was not distended. The explanation of this case offered by

⁶⁴ Journal of Nervous and Mental Disease, July, 1917, p. 35.

Lillie is a psychological one. The woman longed for pregnancy and the position assumed was in a measure a wish fulfilment of this longing.

Reaction of the Pupil to Colored Light. It occurred to Cutting⁶⁵ that possibly different colored lights might have a different effect in pupillary reaction. He investigated to see whether colored light caused the same pupillary reaction as white light, whether a certain color produced a specific pupillary response in a particular disease, and whether the use of colored lights was of clinical value. Two hundred cases of different diseases were studied. White light gave the greatest contraction of the pupil, then came yellow, then red, green, and lastly blue. A four candle-power white light gave a much greater reaction than the eight candle-power blue light. No evidence could be obtained as regards any specific reaction to colored lights in different diseases.

Treatment of Graves's Disease with Corpus Luteum. Hoppe⁶⁶ has treated 20 cases of Graves's disease in the past two or three years with corpus luteum in combination with the hydrobromide of quinine and extract of belladonna, and the improvement has usually been so marked and so rapid in a few days to a week as to convince him that rest, diet, hygienic measures could not account for the result, and he believes the corpus luteum is the active therapeutic agent. The cases were all positive examples of Graves's disease. Twelve were of the more severe type with rapid emaciation, great nervous excitability, rapid pulse, pulsating thyroid gland, diarrhea, etc. The other 8 were moderately severe cases. The improvement in 2 or 3 cases seems to be questionable. The most notable change was in the cardiovascular symptoms. The pulse rate dropped quickly and the disagreeable symptoms caused by the disturbance of circulation quickly subsided. Then the general nervous irritability diminished. There was a tendency to relapse if the corpus luteum was stopped.

The Psychoneurotic Syndrome of Hyperthyroidism. In such a place as the sanitarium at Clifton Springs opportunity is given for the examination of a large number of cases of hyperthyroidism. Woodbury⁶⁷ has subjected 300 histories to a close analysis, and he has attempted to trace the mental and nervous course of the non-insane cases of thyrotoxicosis. Insanity is present only in a relatively small proportion of cases of hyperthyroidism. He concludes that the view of certain alienists that the thyrotoxic psychosis does not deserve a separate classification is probably correct. There is, however, in the non-insane cases of thyrotoxicosis, a very definite mental and nervous picture differing in degree and somewhat in type according to the acuteness and type of dysthyroidism. Depression of moderate duration is more common in thyrotoxic non-exophthalmic cases than in the exophthalmic, and when it occurs in the latter it is usually much more transitory, in neither is it usually associated with self-accusatory delusions. The clinical picture is made up of nervous hypertension, depression, apprehension, worry, insomnia, vertigo, deficient concentration, etc.

⁶⁵ Journal of Nervous and Mental Disease, October, 1917, p. 246.

⁶⁶ Ibid., April, 1918.

⁶⁷ Ibid., June, 1918.

Progressive Muscular Dystrophy. In attempting to prove that muscular dystrophy is of endocrine origin, Janney, Goodhart and Isaacson⁶⁸ suggest that it is merely a symptom-complex caused by deficient function, not of one but of various organs separately or coincidentally affected. This view seems to them reasonable when one considers that the symptoms which are known to represent dysfunction of one endocrine gland are often very similar or identical with the manifestations of the affection of another ductless gland. Thus, stoppage of growth, adiposity and defective bone formation are known to result from lesions of pituitary, thyroid or sex glands. If these symptoms are connected with such widely different organs, it seems not improbable that muscular dystrophy may likewise prove to represent a symptom-complex capable of being caused by dysfunction of various ductless glands singly or together. They do not ascribe muscular dystrophy to hypothyroidism although their experiments might seem to justify them in so doing.

Traumatic Muscular Dystrophy. Most muscular atrophies occurring in the war have their origin in injuries of peripheral nerves; others are the result of injuries of bones or joints, as traumatic or infectious arthritis. Another form of atrophy Français⁶⁹ believes is caused by the explosion of shells, from which probably an alteration of the muscular fibers results. Cases of this kind are rare, but a few have been reported, and one of this type is described by Français.

A man received a slight wound of the head from a piece of shell, and two months later muscular atrophy began in the face and scapular girdle. No nerve lesion could explain an atrophy such as this, and it assumed the type of progressive muscular dystrophy. There was no reaction of degeneration. Français believes the shell explosion was the cause, and he believes further that explosion may also produce the condition seen in Thomsen's disease. The two types may coexist. The development of the atrophy two months after the traumatism seems to be his chief reason for accepting a relation of cause and effect.

Fibrillary Tremor as the Cause of Muscular Atrophy. An ingenious explanation for the muscular atrophy associated with degeneration of peripheral motor neurones has been offered by H. C. Stevens.⁷⁰ Usually this atrophy has been attributed to the loss of the trophic function resulting from injury of the motor nerve cells or of the peripheral motor fibers, but Stevens attempts to show that the wasting of the muscles is due to an incessant fibrillar activity of the muscles, which begins from three to six days after nerve section and persists until the regeneration of the nerve.

Neurologists are very familiar with the fibrillary tremors occurring in wasting muscles from disease of the cells of the peripheral motor neurones, but such tremors have not been accepted as the cause of the atrophy.

Stevens's experiments were performed on dogs. The facial, the hypo-

⁶⁸ Archives of Internal Medicine, February, 1918.

⁶⁹ Revue neurologique, November and December, 1916, Nos. 11 and 12, p. 494.

⁷⁰ Journal of the American Medical Association, March 23, 1918, p. 835.

glossus, and the tibial nerves in certain animals were cut. Of these nerves the hypoglossus is the most satisfactory, because the fibrillation can be observed directly in the tongue either on the dorsal surface or underneath. Where the muscle is covered with skin, it is impossible to see the movements. In clinical neurology, however, this statement by Stevens does not hold good, as fibrillary tremors are often seen in muscles covered by skin.

In Stevens's experiments a fine tremor-like movement appeared about the third day underneath the tip of the tongue on the operated side, and was more pronounced when the tongue was moist. As time passed the fibrillation spread toward the root of the tongue. The rate of movement was from ten to twenty times a second. From eight to twenty days after the operation the mucous membrane on the dorsum of the tongue began to show folds and fissures, owing to shrinkage in the volume of one-half of the tongue. There seemed to be an exact parallelism between the appearance of the contractions and the wasting of the muscle, and between the disappearance of the contractors and the return of voluntary control.

Muscular Stupor is probably a term which conveys little meaning to most persons. Tinel⁷¹ employs it to describe an injury of the biceps muscle caused by a bullet passing through the muscle. He found three weeks after the injury that while the forearm could be flexed forcibly on the arm, the flexion was done entirely by the supinator longus, and the biceps remained flaccid. The electrical reactions of the biceps and musculocutaneous nerve were entirely normal. This purely functional palsy of the biceps disappeared after massage and faradization had been employed a few days.

Epilepsy. Irritation of the occipital pole of the cerebral hemisphere, as by trauma, may give rise to scintillating scotoma, as shown by Chatel and Patrikios.⁷² This scotoma in turn may be followed by epileptic convulsive attacks, so that the scotoma may become the aura in the attack.

⁷¹ Revue neurologique, June, 1917, p. 300.

⁷² Ibid., April and May, 1917, p. 259.

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